In Service Performance Evaluation of Erosion Prevention Sediment Control Devices

A Thesis Presented for the
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Ali Riza Hangul
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ABSTRACT

The Erosion Prevention and Sediment Control (EPSC) market continuously expands with the addition of new products based on research and development. While some products may require special equipment for installation, others are installation ready. There have not been any investigations conducted on installation complications and cost to gain feedback from construction field personnel with regard to which practices are performing better and/or are preferred. The objective of this thesis is to further evaluate the current practices from performance and cost perspectives, in order to improve the plans development efficiency for the Tennessee Department of Transportation' Roadway Design, Environmental, and Operations Divisions.

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CHAPTER I

INTRODUCTION AND GENERAL INFROMATION

Introduction

Erosion Prevention and Sediment Control (EPSC) devices are widely used during construction projects by DOTs nationally to prevent or reduce the movement of sediment that is carried into lakes, streams and rivers by storm water runoff from a site during construction and are required by state water quality and storm water regulations. Preventing erosion reduces the amount of sediment that leaves a construction site which carries nutrients and pollutants that degrade water resources and harm aquatic wildlife. Proper planning of construction site activities greatly reduces the impact of soil disturbance on nearby resources (Minnesota Storm water Manual). Although erosion on construction sites often affects only a relatively small acreage of land in a watershed, it is a major source of sediment because the potential for erosion on highly disturbed land is commonly 100 times greater than on agricultural land (Brady and Weil, 1999). Tennessee Department of Transportation (TDOT) has developed standard drawings per state water quality and storm water regulations (TDEC Construction General Permit) and their Drainage Manual (Chapter 10) to provide guidance to roadway designers in order to develop erosion control plans to protect natural water resources during temporary roadway construction activities.

It is evident that more information is needed to better asses the amount of sediment lost during the temporary construction actives including phasing activities observing field performance of EPSC devices, and improving design and implementation of EPSC devices based on past experience. This need has been elevated not only by design professionals who are directly involved in the development of erosion plans, but also operations professionals and other agencies and research institutions. Since the first published guidance, EPA, Guidelines for Erosion and Sediment Control Planning and Implementation, August 1972, other research has provided additional design guidance to improve practices such as NCHRP Project 16-3 Erosion Control during Highway Construction Volumes I and II, February 1976. Currently every state department provides specific EPSC guidance that serves best for their state needs. North Carolina Department of Transportation, Storm water Best Management Practices Toolbox, Version 2, April 2014, is an example to such guidance. As the foundation of best management practices are laid and lessons are learned, new research projects continuously provide improved guidance for practitioners use.

The performance, in terms of reduction of sediment erosion, off-site transport, and product durability, has only been studied at TDOT active roadway construction sites at a limited degree. A few examples include, T. Diehl, Suspended Sediment Concentrations at Six Highway Construction Outfalls, USGS 2014, Statewide Construction Storm Water Turbidity Monitoring Study for the Tennessee Department of Transportation 2010-2012. TDOT Materials and Test Division, National Wattle (Sediment Tube) Survey Report, April 2006, and Summary report, Detailed Analysis related to the Functionality of TDOT Standard Erosion and Sediment-Control Structures under Conditions Presented by the 2-year/24-Hour Storm Event in Tennessee, July 2002.

In order to implement the results of the subject studies into a practice, as well as assessing the current practices, the objective of this research is defined as to investigate in service performance of the effectiveness of current TDOT-EPSC device installation practices in field. In addition, this research further evaluates the application guidance and quantity calculation methods currently provided for each EPSC device, estimates more accurate total cost of installed devices based on initial installation, maintenance, and field performance. Outcome of this research will result in improved quality of standard drawings, accuracy of contract plans, as well as construction cost estimate, which should reduce the number of change orders and construction cost overruns. The practices included in the construction plans and SWPPP will need to control runoff, stabilize slopes and exposed soils, and limit the movement of soils into drainage systems and natural areas. A key element to ensure effectiveness of the erosion and sediment control plan is the implementation of an inspection and maintenance program. Frequent inspection and maintenance activities ensure that the installed temporary sediment control practices are operating effectively throughout the course of the project. All of the best management practices currently being used by the department are shown in the Drainage Manual-Chapter 10 and roadway standard drawings. They have been certified by the TDEC, confirming that they meet the requirements of Construction General Permit. Erosion Plan sheets for the final construction plans were developed and quantities were calculated based on subject documents.

The EPSC market continuously expands with the addition of new products based on research and development. While some products may require special equipment for installation, others are installation ready. There have not been any investigations conducted on installation complications and cost to gain feedback from construction field personnel with regards to which practices are performing better and/or are preferred.

The department is aware of the issues with current practices and has recently established a new standing EPSC Policies Committee that is represented by multiple divisions. Recently, this committee initiated a research study with UT's Department of Civil and Environmental Engineering to achieve "In Service Performance Evaluation of EPSC Devices" that is led by the Roadway Design Division. The objective of this research is to improve the plans development efficiency for the Design, Environmental, and Operations Divisions.

Method

Three separate tasks were completed to answer the research questions and achieve these objectives. First, the In-Service Performance Evaluation Questionnaire was prepared using Google Docs. Then, specific questions concentrating on specific areas were prepared. Lastly, the total of 56 survey questions were developed are grouped under four major areas: installation (11 questions), performance (25 questions), maintenance (9 questions), and plan accuracy (11 questions). The first step was to distribute the survey to 400+ people including roadway designers, consultant engineering firms, Storm Water Pollution Prevention Plan (SWPPP) consultants, construction field inspectors, and Construction Engineering & Inspection (CEI) Consultants. A total of 24 responses (Table I) were received from professionals who are best represented by their involvement in the SWPPP development or field implementation of EPSC.

Table I- Survey Participants

Name	Job Title, Region, and/or District	Email
Mark Janssen	Project Manager, CEC Inc.	mjanssen@cecinc.com
Casey Oliver, EI	Project Engineer, BWSC	casey.oliver@bwsc.net
Thomas "Tommy" Paul	Environmental Coordinator Region 2	Tommy.Paul@tn.gov
Tracy Hillis	Operations Tech.2 /Region 2/District 28	tracy.hillis@tn.gov
Shannon Henry	Transportation Project Specialist	Shannon.Henry@tn.gov
William Lowery	Operation District Assistant - District 48	will.lowery@tn.gov
Jonathan Edwards	Transportation Project Specialist, Region 2, District 29	jonathan.edwards@tn.gov
Jason Farmer	Operations District Supervisor, Region 1, District 17	Jason.Farmer@tn.gov
Jason Ingram	Transportation Project Specialist, Region 2, District 29	Jason.ingram@tn.gov
Deidera White	Operation District Supervisor,1/1923	deidera.white@tn.gov
Edward Hammett	CADD Tech. 3, Region 1	ed.hammett@tn.gov
Brian Lee	VP Palmer Engineering	blee@palmernet.com
Richard Gammon	Engineering Technician, Palmer Eng.	rgammon@palmereng.com
Frank R. Fulgham	Cad Tech 4	frank.fulgham@tn.gov
Dominic Stone	Staff Designer, DBS Eng.	dstone@dbsengr.com
Michael Tapp	Transportation Engineer, BWSC	michael.tapp@bwsc.net
John Pachol	Civil Engineer, Region One	bpachol@johnsoncitytn.org
Anthony Holcomb	Vice President, Wilson & Associates	tholcomb@wilsonpc.com
Jason Siverling	Project Manager RGC	jason.siverling@rgc-a.com
Jon Zirkle	C.E. manager 2, Region 3 Project Dev.	jon.zirkle@tn.gov
Darell Bridges	Roadway Spec II	darell.bridges@tn.gov
Chawanpon Bunniran	PE, CPESC, Allen Hoshall Eng.	cbunniran@allenhoshall.com
Jeff Shaver	Civil & Environmental Consultants, Inc.	jshaver@cecinc.com

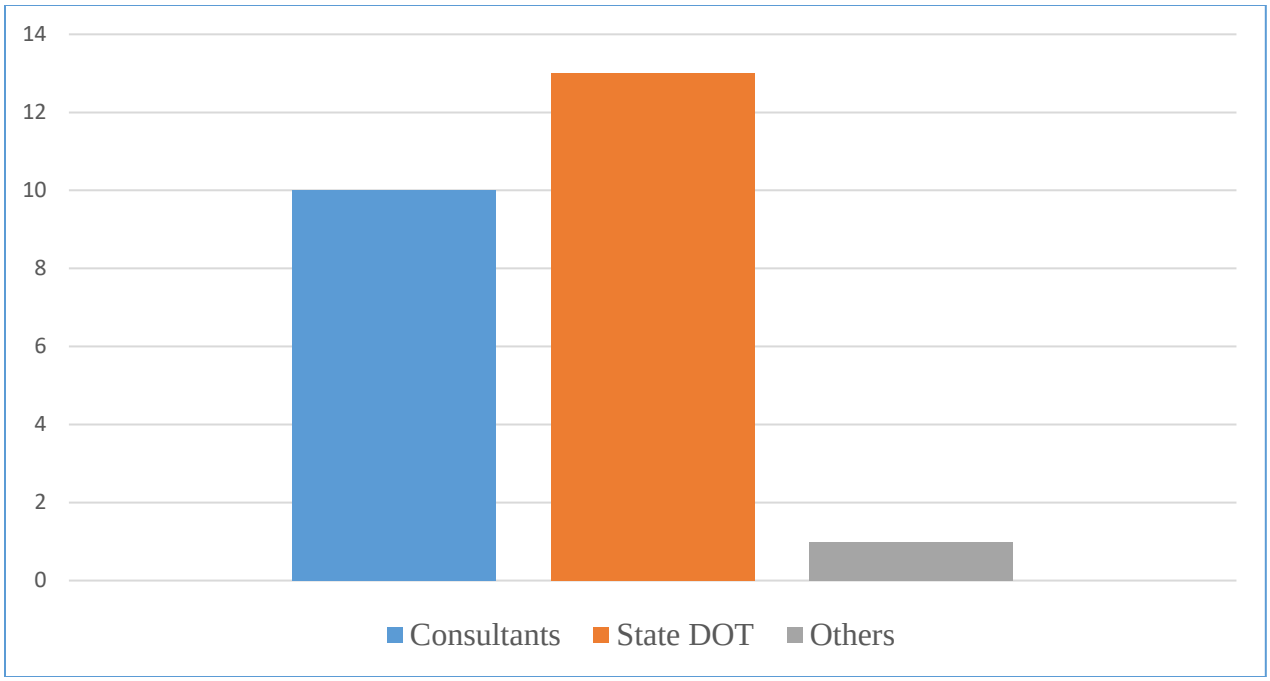

Figure I- Background of Survey Responders

Chapter II of the report summarizes the responses to the survey questions and recommendations to improve the current TDOT EPSC practices. (Please find the complete list of survey questions and responses under Appendix C).

The second step was to perform field visits to active construction sites. They were identified by TDOT Environmental Compliance Officers. Two separate site visits were completed. The first visit was to Region 1 (Knoxville and surrounding counties) and the second to Region 3 (Nashville and surrounding counties). Five construction sites were visited with large disturbed lands. TDOT inspectors and contractors facilitated the field investigations and answered questions. Appendix A of this report summarizes the site visits with pictures of installed/inspected EPSC devices.

The third step was to review all survey responses and field investigation findings and apply the findings to each current EPSC practice in accordance with the standard drawings. Appendix B of this report tabulates the recommendations to current standard EPSC drawings based on the research findings.

Results and Discussion

The following results are based on the 24 survey responses received. The final survey results summarized under each focus area, installation, performance, maintenance, and plans accuracy (Appendix C) and they are evaluated based on participant's background. While CEI consultants and TDOT field inspectors provided valuable feedback on installation and maintenance issues based on their field experiences, project designers provided good feedback on performance and plans accuracy related questions. The results also included the findings from site visits,

discoveries from interviews with constructors, and filed personnel, as well as review and evaluation of the current TDOT standard drawings.

Please find below the in-service performance evaluation results of this research documenting the issues TDOT is currently experiencing during the implementation of EPSC. The Section 1.4.1 is provides recommendations to the department about how to improve both design and construction phases of a roadway project.

What are the most common field changes on erosion plans, as designed vs. as constructed, for EPSC best management applications and what is the reasoning behind these changes?
Relocating silt fence, substituting it with silt fence with wire backing, modifying rock check dam (or enhanced rock check dam) to fit geometry or substituting them with sediment tubes, as well as increasing the number of ditch checks are the most common field changes. These practices are needed due to construction phasing and/or site management practices.

During construction it is common for a contractor to modify construction phasing. While the quantity and location of many devices may still function as designed, others may need modifications. The current practices do not allow any flexibility to add new devices and change quantities without a construction change order. Change orders are highly undesirable due to the additional time they take to get approved and the possible added cost to the original estimated construction cost. The department highly discourages this because numbers of change orders are performance indicators for the department monitored by the Federal Highway Administration. In order to eliminate this issue, it is recommended to identify and list the most commonly used and best EPSC management practices and include them in tabulated quantities of construction plans. This will provide flexibility to use various products if the need arises during construction.

What are the deficiencies of installation details shown on current roadway standards that are not applicable to common field conditions?
Silt Fence, Silt fence with Wire Backing, Rock Check Dam, Enhanced Rock Check Dam, and Sediment Tubes are the most commonly used devices. The most common installation issues of each device are listed below.

a) Silt fence and silt fence with wire backing standard drawings show a maximum of 4" wide trenching. Despite this requirement, alternative trenching practices are common in the field such as plowing or using a backhoe. Those practices leave a wider trench width and excessive disturbance which results in structurally deficient post installations. It is recommended to further evaluate trenching practices and require installation of posts resting against undisturbed downstream banks. The current installation guidance does not address how posts should be installed when they encounter rocks. Guidance, such as eliminating a few posts and trenching, going around an obstruction, or terminating the installation, is needed.

b) TDOT Qualified Product list and standard drawings were reviewed based on AASTHO Material Specification M-288, 2017 developed for road construction. It was found that the current silt fence fabric specifications for different class geotextiles and silt fence installation details are not corresponding with to each other.

c) Polyacrylamides (PAM) were used in a few projects. Application of PAM requires additional guidance on the types of products used, application rates, and different types of soil conditions. It was found that TDOT Design Division is currently working to develop a new flocculent guidance for the current Drainage Manual (Chapter 10).

d) The current instructions recommend installation of silt fence with wire backing when the disturbed areas are close to water. The geotextile fabric used for this device has a water flux value (18 vs. 4 GPM/SQFT) that is four times larger. Despite being stronger, the fabric and wire backing do not add any benefit to the protection of the waters of the state. More affordable and effective practices such as using silt fence with sediment tube or mulch would provide improved sediment filtration, compared to the more expensive and less effective silt fence with wire backing.

e) Catch basin inlet protections are generic devices designed by TDOT. While smaller CB inlet protection frames are manufactured and used by some contractors, many others prefer premanufactured light weight devices such as Silt Saver. Inlet protection standards for larger catch basin boxes, such as 7'x7', have never been used due to the amount of work that is required to manufacture one. Removing these applications will have no impact on the best management practices.

f) Level spreaders have not been used on any TDOT construction project. It may be an effective device to reduce erosive waters leaving construction and permanent agricultural applications. Unfortunately, installation of this device is not as practical as a temporary EPSC management practice. There are many other devices available, such as a sediment tube. Removing this application will have no impact on current practices.

g) Enhanced silt fence checks are not used any longer due to poor field performance. They are not stable and they require extensive maintenance. Removing this application will have no impact on the current best management practices.

h) Gabion check dams are not used. Gabion baskets are not practical to be installed as a temporary EPSC device. Manufacturing a gabion basket is time consuming and once placed cannot be relocated. They are excellent for permanent bank stabilization or preventing stream of head cut. It is recommended to remove Gabion Basket standard drawings EC-STR-55, 56, 57, 58, and 59. This move will have no impact on current best management practices.

i) Rock Sediment Dam and Rock and Earth Sediment Embankment devices have not been used. They are not practical and their size is too large for temporary EPSC management practices. Removing those applications will have no impact on current management practices.

What deficiencies can be further modified to address field conditions, for example modifying design parameters for some devices such as slope, distance, height, size, or using proprietary products?

During field visits, it was observed that Silt Fence was being used as a construction site delineator. This installation practice crosses the contour lines. Regardless, the ground geometry silt fences installed at higher ground elevations where silt fence is not needed. It is recommended to develop a construction site delineator fence detail similar to a high visibility fence. This alternative device will be cheaper and faster to install since no trenching will be required during installation. Additionally it will provide better delineation of a construction site.

Regardless of the type of device installed, it is a challenge for TDOT Environmental Compliance Office inspectors to have a contractor repair or maintain identified deficiencies. The current payment method does not include the maintenance of installed devices, but only addresses sediment removal activity. It is recommended to create a new generic payment item number for contractors to get compensation for the maintenance of EPSC installation deficiencies.

Rock check dam and enhanced rock checks are the preferred ditch check methods because once installed they do not need frequent maintenance. Enhanced rock checks perform well in field. However, field observations showed variation in weir opening sizes when compared to the standard drawing weir opening requirements. Sediment tubes are also used often as a ditch check. They perform well at mildly sloped ditches and slopes. However, overlapping or stacking details for ditch application is not practiced to achieve the proper height for ditch checks. The feedback received from field personnel was that the lighter the material, the harder it is to maintain. It is suggested to reevaluate the ditch check installations practice using sediment tubes. Sediment Tubes are not a direct substitution for rock check dams when it comes to field performance. Silt fences are rarely used for ditch check. Enhanced silt fence for dich checks should be removed from standards due to poor field performance.

What benefits may be gained from installing repetitive devices and what is the cost-benefit ratio for different sediment control device treatment-train combinations?

TDOT experienced repetitive installation of devices during the SR-840 construction in order to meet more restricted turbidity levels. The project included various repetitive applications and turbulence monitoring. The applications have been monitored and the results have been reported by USGS. It is recommended to adopt such devices as a standard practice and to further recommend them to be used close to bodies of water or environmentally sensitive areas.

The current practice is to install Temporary Silt Fence with backing item No. 209-08.02 close to bodies of water. The average installation cost is close to five dollars per linear ft. with #70-100 standard sieve opening. Replacing this with Silt fence 209-08.03 #30-70 standard sieve opening in conjunction with a sediment tube 740-11.01 would double the system's filtration efficiency and with half the cost.

What project development phases need improvement?

Both design and construction phases need improvement. The engineering design phase should include a site visit to understand how projects will be constructed and phased. The site visit and communications among design, construction, and environmental divisions will improve the overall plans quality and EPSC practices for all construction projects. Currently, the department is adding a new mandatory site visit to improve final construction plans quality. Even though the purpose of this new field review step is to review more costly roadway features, such as

structures, construction phasing, or work zone traffic control, it also includes a review of erosion plan development.

New design training is suggested in order to improve erosion plans' quality and consistency. Currently, the department offers two trainings to roadway designers, EPSC Level I and Level II. Both trainings are developed and provided to industry by TDEC. Level I is mandatory for all field personnel and Level II is mandatory for all design personnel. TDOT Environmental Division developed new training for field personal to substitute TDEC Level I certification training. Several TDOT field inspectors and designers have EnviroCerts's CPECS certification to meet the industry's standards. It is strongly recommended to develop a new training module that is specific to the roadway design erosion plan development. Such training would provide base design knowledge on current practices and help designers understand how to calculate quantities better.

Another issue identified as a result of the questionnaire was the lack of knowledge about the installed proprietary product. Having installers certified to install proprietary products would eliminate delay due to corrections later. Changes have to be made to TDOT practices in order for contractors to not be paid for deficient installations. An inspection form similar to guardrail installation may be developed to document proper installation and payment release.

Conclusions

What recommendations can be given to TDOT to modify the current practices?

Recommendations for the project development Phase

a) Have a site visit and review the development of plans.
b) Develop a new erosion prevention plans development training.
c) Identify and list common EPSC item numbers on all plans to eliminate change orders during construction. Use hydro mulch more often.
d) Review silt fence fabric specifications and rock check dam quantity calculations. Improve guidance regarding use of mulch and seed. Use tackifiers with straw. Limit the use of sediment tubes in ditches.
e) Evaluate, delete, and modify current standards for different applications as shown Part IV.
f) Develop a construction site delineator standard using high visibility fence.
g) Develop a new standard showing repetitive practice installation detail.
h) Develop a j hook detail for silt fences.
i) Reevaluate the recommended use of enhanced silt fence with wire backing close to bodies of water.
j) Improve EPSC device legend and plan scale to improve the intended erosion control design.
k) Remove best management practices that have never been used.

Recommendations for the Construction Phase

a) Do not pay contractors for deficient installations. Develop a new form to document installations and proceed with payment only after Environmental Compliance Officer signs the form.
b) Create a new generic payment item number to correct maintenance of devices installed during service and have the contractor be properly compensated for corrections. Ask for the work documented on the new form of payment.
c) Require installers to be certified for proprietary products by the manufacturers.

CHAPTER II

SUMMARY AND EVALUATION OF SURVEY QUESTIONS

Evaluation of Installation Practices

Name the types of EPSC types typically used in your region/district.
The most common EPSC devices used on TDOT projects are, Silt fence, Silt fence with wire backing, Rock check dam, Enhanced rock check dam and sediment tubes.

What difficulties are encountered during installation of named structure(s)?
General Installation issues are, not following contours or not properly trenching silt fence devices. Not having proper weir opening as well was not extending far enough to reach out above the banks. Responds indicated the calculated rock quantities on the plans for the rock check dams are always short. Methods to calculate estimated quantiles needs to be investigated. The last difficulty is, contractors not installing devices per the standards.

What can be done to improve the installation efficiency of named structure(s)?
Improved supervision with qualified personnel. Train contractors. Require a certification for a compiled list of TDOT Certified EPSC BMP contractors. Have contractors understand that no payment will be given for inappropriately installed BMPs.

What EPSC products are the most difficult to install in accordance to the current installation details?
In stream diversions are hard to install if it is not shown on plan set. Erosion control blankets are not keyed. Sediment tubes are not trenched. Silt fence with wire backing is hard to install.

What can be done to improve the current installation practice per EPSC device?
Better training of subcontractor and contractor personnel. Payment in lump sum of all BMP use per phase of SWPPP. Better selection of devices for particular applications. Do not pay for items not installed per standard specifications.

How can the installation be modified to improve installation efficiency but retain the level of EPSC performance effectiveness?
Rock check dam height based on dich depth. Develop a J hook detail. Better categorization of storm water inlet protection devices. Alternative if rock is encountered during trenching. ROW to adequately accommodate the BMP.

What measure is consistently not installed in accordance with current installation details?
Check dams, Erosion control blanket. The manufacture’s installation drawings/instructions which when the product is placed on the QPL need to be readily available during construction.

Are multiple EPSC devices designed and installed in a drainage sequence?
Yes.

Does a treatment train of multiple EPSC devices improve site performance reducing erosion?

Yes.

Do you have any recommendations about current installation practices?
Encourage the contractor to take the time to install the measures.
Need to be more of a priority for contractors.
Contractor has been paid for poor installation.

Recommendations to Current Installation Practices
Survey responses identified that the most common EPSC devices used on TDOT projects are Silt fence, Silt fence with wire backing, Rock check dam, Enhanced rock check dam and sediment tubes. The General Installation issues can be grouped under two categories: Improvements on standards/plans and field installation practices.

Design Standards/Construction Plans
Investigate the current guidance related to Rock check dam height based on dich depth. The rock check dam quantities on the plans are always less than what is needed. Update the estimated quantities practices for rock check dams. Re-categorize storm water inlet protection devices. Develop an alternative installation detail when rock is encountered during trenching. Develop a J hook detail for silt fence installations. Reevaluate and provide guidance for current trenching practices, plowing or using bucket. Provide guidance to have the necessary ROW to adequately accommodate the BMP.

Field Installation practices

Have the manufacture's installation drawings/instructions which, when the product is placed on the QPL, need to be readily available during construction.
Better training of subcontractor and contractor personnel. Payment in lump sum of all BMP use per phase of SWPPP. Better selection of devices for particular applications. Develop an installer certification program to eliminate poor installation practices or devices installed not confirming standards. Encourage the contractor to take the time to install the measures. Contractors understanding installation and/or maintenance of EPSC devices in timely manner is a priority for TDOT construction sites. Do not pay for items not installed per standard specifications, such as erosion prevention devices not following ground contours, not properly trenching silt fence devices, not having a weir opening by depressing rock check dam or not extending far enough to reach out above the banks.

Evaluation of Field Performance
Which products are failing once installed in accordance to the current installation details?
Geo hay, sediment tubes, silt fence.
Most all products work fine when installed in accordance to the current installation details.

What products are the most effective when installed properly?
Enhanced Rock check dams.

Which product's performances are not meeting the design criteria shown in the standard drawings?

Sediment Tubes and Silt fences.

What component of the device is over designed or needs improvement?
Sediment tube staking and installation.

Is trenching of silt fence necessary? If so, what recommendations can be made to improve installation?
Yes, trenching is necessary, do not allow plowing or bucket trench excavation methods, and add j-hooks.

Is trenching of rolled erosion control products necessary to maintain intimate contact with soil?
Mixed feedback. Improving installation to have a better soil contact is needed.

Do you see any benefits in minimizing soil disturbance during the installation of such products?
Limit trenching practices do not allow digging with bucket equipment or ripping with plow.

How often is newly applied straw mechanically crimped or chemically tacked to soil?
Practice needs improvement in field.

Do you see the cost benefit of limiting the application of enhanced silt fence with wire backing to only steep fill or cut slope locations?
It lasts longer. Need to investigate the practice of using this device close to water.

What products are preferred by contractors?
Rock check dam and, Sediment tube.

Is trenching of rock checks and enhanced rock checks necessary to improve performance of the measure?
Mixed feedback but, No.

How often is mulch applied at the specified rates per TDOT standards?
Mixed feedback. Seldom, practice needs improvement in field. No consistency.

Are there any EPSC devices shown on the plans that you generally change to an alternate device in the field due to your experience with its performance? If so, please explain.
Limit the use of CB inlet protection, especially for large structures. Delete Enhanced silt fence checks for dich applications. Set up short-term dich check application with sediment tube.

How often is fertilizer used when applying vegetation?
Mixed feedback. Practice needs improvement in the field.

How often seed beds are properly developed when applying vegetation?
Practice needs improvement in field to use often.

Have you used PAM (polyacrylamide) on a project? If so, how did it perform?

Practice needs improvement in field to use often.

Have you used Bonded Fiber Matrix?
Limited use. Explore to expand the use.

If you used Bonded Fiber Matrix, have you applied with seed or without seed?
Limited use. If it used seed applied.

If you used Bonded Fiber Matrix, how did it perform?
Positive experience explore how to use more.

If you used Bonded Fiber Matrix, did the performance justify the cost difference with typical seed and mulch?
Yes the cost is justifiable. Especially at locations with limited access.

If you used Bonded Fiber Matrix, are they equal to or better than blankets?
Quick results and easy application.

Have you used Tackifiers? What types of Tackifiers are being used?
Very limited use. Explore how to expand the use of Tackifiers.

Which TDOT catch basin/area drain inlet protection have you found to perform the best?
Remove Type E from EC-STR-19. Others devices are working well. Limit the field installation time for generic CB assembly standard. Silt Saver is a good CB protection.

Do you have any recommendations about performance of EPSC practices?
Explore how to use sediment basins often since they allow contractor to perform construction phasing freely. Remove sediment tubes from ditch applications. Provide erosion prevention measures at the earliest possible time.

Recommendations to Field Performance

Most products work fine when installed in accordance to the standard drawings. However, light products such as Geo Hay, a filter sock (non-biodegradable), consisting of rolled recycled carpet, or sediment tubes (biodegradable) do not perform well in ditch applications if they are not staked correctly. They are not heavy, which provides handling benefit to installers. Therefore, unlike rock check dam, they move by the sediment leaden concentrated discharges. Survey responses, based on field performance, indicate that they are not a direct replacement to rock check dam or even silt fence when installed in ditches. Further investigation is recommended to improve the performance of rolled erosion control products (RECP), especially staking options. Mixed responses were received regarding trenching of RECP. Although 2" trenching is shown on the current standard, it is favorable to minimize ground disturbance during installation. The benefits of trenching need to be investigated as well. It is recommended to provide guidance for service life of sediment tubes.

Stability and performance of silt fence is based on correct installation practices. Current trenching practices, trenching with bucket equipment or ripping the ground with plow, should

not be allowed because removal of a large quantity of earth effects fence stability. Among all silt fence devices the silt fence with wire backing is the most preferred device by contractors because they stay stable for a long time. The current TDOT standards do not have a J-hook detail, however it is recommended to develop a detail for long installations.

Silt fence with wire backing is used at locations close to bodies of water. Other than stability, this practice does not offer any additional benefit. This practice needs further investigation. Another recommendation received from the responses is to eliminate the use of "enhanced silt dams in ditch". This practice has not been used in field often, however, when it is used, it performs poorly. Therefore, it is recommended to eliminate this device.

Rock check dams are the preferred device by contractors. Responses indicate Enhanced Rock Check Dams are effective and easy to install. They are durable and do not need frequent maintenance. Current installation issues are not having proper weir opening, not extending to dich banks and not placing geotextile fabric under the device extending downstream. Often, the provided rock quantity on plans are less than what is needed during construction, so it is recommended to investigate the current calculation methods for tabulated quantities.

Catch basin inlet protections, as shown on current standards, are manufactured by a wooden frame covered by geotextile fabric. Building boxes is time consuming, so it is not a desirable option by contractors in accordance to the responses. Often, "Silt Saver", a type of manufactured product is used for CB inlet protection. Limiting the use of this device to only small size catch basin structures is recommended. Remove Type E from EC-STR-19; this practice is not recommended.

Seeding and mulching related survey responses indicated that the application process needs improvement. Preparation of seed beds, applying fertilizer, and/or seed is not consistent. Clarifying the application requirements and quantities is recommended.

PAM is used rarely. There was mixed feedback on questions that indicated better guidance is needed. TDOT recently updated the guidance under a new section called, Flocculants. Future field practices will improve the use of flocculants.

The department has limited experience with the use of Bonded Fiber Matrix. However, the feedback is very positive. The product has a promising future in erosion prevention practices. Seed has been used in this application. It is the preferred method compared to erosion control blankets. It provides intimate contact with a much faster growth rate. It is the preferred method for locations where the placement of erosion control blanket is not possible. Having bonded fiber matrix item numbers on all future erosion plans will increase the use of this application.

The experience with tackifiers is very limited. Using tackifiers with straw should be encouraged since crimping is not a common practice.

Sediment basins provide flexibility for a contractor to work freely within the disturbed area. It is recommended to explore the use of sediment basins more often. Currently TDOT is working on another research project to improve the design and installation of sediment basins.

Evaluation of Maintenance Practices During Construction

Which EPSC products are the easiest to maintain?
Silt fence with wire backing and rock check dams.

Which EPSC products are the most difficult to maintain?
Sediment control devices, sediment trap, sediment filter bag, sediment ponds, and check dams.

Are there products that seem to cost too much but perform superior to others?
Hydro mulch, filtrexx, rock check dams.

From your perspective, is it possible to reduce the frequency of inspection?
Inspections are needed not only to monitor the performance of the device (stable and cleanout) but mostly to address dynamic changes within the construction area.

What do you consider as the most difficult maintenance technique?
Sediment removal, cleaning rock check dams or sediment filter bags.

Would there be a benefit to having a separate line item for maintenance of EPSC devices? Please explain.
Yes. Consider to pay maintenance separately.

Do you feel that the estimated quantities for EPSC items generally include an adequate amount for maintenance and replacement? Please explain.
The only maintenance pay item is removing sediment. There is no maintenance pay item to correct deficiencies has been established.

Is the EPSC device installer typically responsible of maintaining the devices? Whether yes or no, please describe the pros and cons.
Prime contractor is responsible for the maintenance.

Do you have any recommendations to improve or eliminate maintenance activities?
Separate pay item for maintenance of installed devices would give incentive to contractors.

Recommendations to Maintenance Practices During Construction

Silt fence with wire backing and rock check dams are the most preferred methods. They have stable installation processes and do not require excessive maintenance, other than sediment removal. On the other hand, Sediment Filter Bags and Sediment Traps are not easy to maintain. They remove large quantities of sediment which requires frequent cleaning. Responses indicated that Hydro mulch, filtrexx, and rock check dams are working better than the other devices. It is recommended that maintenance activities to correct device installation issues should be payed separately. This practice will give incentive to the contractor to fix and maintain installed devices. Also, no payment should be made until all deficiencies are corrected, as identified by field inspectors.

Evaluation of Erosion Plans Accuracy

Are there any devices in which the tabulated quantities do not match the plans?
Yes. Rock check dam rock quantities.

Do you have any other recommendations to modify the current practices?
Design phase field visit, more oversight of contractors installing devices.

Are there times when devices are not accurately depicted on the plans?
Explore the possibility of correctly locating and scaling devices on the plans. Improve QA/QC review of Erosion Control Plans.

Are there any EPSC devices, which TDOT has a standard drawing for, you never use? If so, please describe.
Recommend removing Enhanced silt fence checks, Gabion Check Dams, Level Spreaders, and Catch Basin Filter Assembly (Type 1).

Are there times when useful EPSC devices/measures are not included as items on the plans? If so, please describe.
List most common devices and item numbers on all roadway plans so a contractor can select an alternative EPSC method without change order.

Do designers properly utilize EPSC devices according to conditions shown on site plans?
Usually they do. Roadway design focused erosion plans development training is recommended.

Are stream diversions being shown on the plans and are they the appropriate type for the field conditions/terrain?
Yes they are shown appropriately.

Are sediment traps being shown on plans where needed? How often do you add sediment traps as a revision to your SWPPP in the field?
Yes they are shown on the plans. Seldom added to SWPPP at locations where rock check dam reached the limits. Suggest to associate two applications so for small drainage areas check dam will be used and for large drainage areas sediment trap.

How often do you use sediment basins as shown on TDOT standard drawings?
They are used rarely, but if shown on plans usually it can be installed in accordance to the details.

How much accuracy should be expected of the EPSC plans and quantities without knowledge of a contractor's construction phasing?
Erosion plans should be discussed during the constructability field review in order to improve plans accuracy.

Do you find that construction phasing and grading substantially affects the actual area draining to a device in contrast to the drainage areas on the plans that the EPSC measures were designed for? If so, how do you adjust for that?
Yes. Often adjustments made to improve erosion control practices in the field.

Do you have any recommendations about how to improve plans accuracy?
Site review is needed. The new mandatory new site visit step should also identify erosion related issues.

Recommendations to Erosion Control Plans Accuracy
Responses recommend to have a site visit during the plans development phase to receive feedback from construction office regarding construction phasing to improve the quality of completed erosion plans. Discussions among Department personnel revealed that a new Site Review step is already scheduled about six months before completing the construction plans set for every project. This mandatory new site visit would help designers identify EPSC strategies during the development of erosion plans. Also, providing additional training to roadway designers on "how to develop erosion plans" is recommended. Currently EPSC device legends show that the plans are not scaled properly and causing confusion.

Silt fence installations sometimes do not follow the contours and miss calculated rock quantities are other common issues. The current practice allow field modifications as needed. Listing the most common devices and item numbers on all roadway plans would also allow contractors to select and use alternative EPSC methods without a change order.

There are few devices that has not been used. Few device delivers poor field performance. Recommended to remove, Enhanced silt fence checks, Gabion Check Dams, Level Spreaders, and catch basin filter assembly (type 1) from the current standards. The use of sediment basins rare but if they are shown on plans they can be built without major modification.

Other

Is there any specific training that you would like have?
Certifying installers should be considered. A new design training is also recommended.

Are there devices that you have used on non-TDOT projects or that you have come up with on your own that you think would be beneficial for TDOT to review?
Review and adopt I-840 devices, consider active treatment systems, limit distance for slope applications. Promote the use of mulch berms often if applicable.

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APPENDICES

APPENDIX A

FIELD VISITS

FIELD VISITS

REGION 3

Date: November 8, 2016

- **Trent Thomas, Region 3 & 4 TDOT Environmental Compliance Supervisor**
- **John S. Schwartz, PhD, PE, Associate Department Head and Professor, University of TN**
- **Sharon Schutz, TDOT Environmental Compliance Manager**
- **Ali Hangul**

TDOT Project: The widening of SR-65 in Springfield TN

Looking upstream

- **Enhanced rock check dam (EC-STR-6A).**
- **Silt deposits indicate that device performed well.**
- **Straw deposits at weir demonstrate that temporary mulch application on slopes did not crimp straw.**

Looking downstream from the proposed lane of the roadway widening project.

Rock check dam (EC-STR-6) used with sediment tubes (EC-STR-37) for ditch check.

Looking downstream

Enhanced Rock Check Dam (EC-STR-6A).

Additionally, silt fence (EC-STR-3B) used as a secondary barrier.

Catch Basin Protection (type B) with sediment tubes (type D) and temporary mulch (EC-STR-19).

Enhanced Rock check dam (EC-STR-6A).

Rock Check Dam (EC-STR-6).

I-65/SR-109 Interchange - North of Portland

Temporary slope protection (EC-STR-34).

Pipe inlet protection (EC-STR-11) used with Enhanced rock check dam (EC-STR-6A).

Temporary slope drain (EC-STR-27).

Culvert inlet protection (EC-STR-11A).

Silt fence with wire backing (EC-STR-3C).

Sediment tube used for ditch application (EC-STR-37)

Erosion control blanket used for slope Installation (EC-STR-34)

REGION I

Date: August 23, 2016

- **Hugh Hannah, Region 1 & 2 TDOT Environmental Compliance Supervisor**
- **John S. Schwartz, PhD, PE, Associate Department Head and Professor University of TN**
- **Payton M. Smith, University of TN**
- **Ali Hangul**

TDOT Project: **SR-115, Alcoa Highway Widening**

Enhanced rock check dam (EC-STR-6A).

Looking upstream

Curb inlet protection, Type 4 (EC-STR-39A)

Rock check dam (EC-STR-6)

Temporary slope drains
(EC-STR-27)

Enhanced rock check dam (EC-STR-6A) shown with temporary slope drain outlet

Suspended pipe diversion (EC-STR-33A)
Upstream side

Suspended pipe Diversion (EC-STR-33)
Downstream side

Sediment Filter Bag (EC-STR-2).
Pad is ready for a filter bag. It will receive pumped water from suspended pipe diversion.

Sediment tube used as a berm (EC-STR-37).
Silt fence with Wire Backing used in the middle of cut slope (EC-STR-3C) .

Silt fence with wire backing (EC-STR-3C) used as a berm.
Mulch applied for temp slope protection.

Enhanced rock check dam (EC-STR-6A).

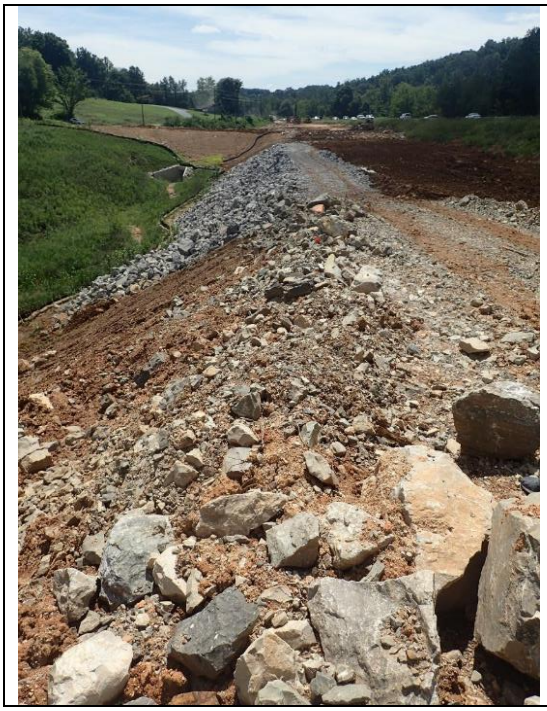
Silt fence with wire backing (EC-STR-3C) used around bodies of water.

SR-33 Widening Union Co.

Silt fence with wire backing (EC-STR-3C) used with sediment tube at the toe of fill slope.

Silt fence with wire backing (EC-STR-3C) used with rock or sediment tube weirs. Two rows of sediment tube used on the other bank.

Temporary Slope Stabilization – mulch W/O Seed.
Straw is not crimped, light coverage,
low berm height failed to divert off site drainage on top of the cut slope.
No intermediate protection within the slope.



Proposed roadway fill with temporary berm (EC-STR-27).
Temporary slope drain has not been installed yet.

Rock check dam (EC-STR-6) looking upstream

Filter sock (EC-STR-37). Short piece of geo-hay tube staked using steel posts.

Looking up

Temporary slope drain (EC-STR-27).

Looking down

Dewatering structure under construction (EC-STR-1).

SR-33 and Beaver Creek Road intersection Improvements, Knox Co.

Permanent drainage basin

APPENDIX B

RECOMMENDATIONS TO EROSION PREVENTION SEDIMENT CONTROL STANDARD DRAWINGS

The list shown below is consist of all current EPSC standards available to roadway designers during the development of roadway pans. A short comment is provided to each standard drawing based on the research findings.

DEWATERING DEVICES

Drawing	Description	Comments
EC-STR-1	Dewatering structure	This is a generic type of device used seldom. Reevaluate the size and investigate how to improve efficiency.
EC-STR-2	Sediment filter bag	Revise QPL and list 15'x15' and 15'x10' devices only

SLOPE DEVICES

Drawing	Description	Comments
EC-STR-3B	Silt fence	Review and revise silt fence fabric specifications to be in conformance with AASHTO M-288 Material Specifications (table 7) Add J hook detail
EC-STR-3C	Silt fence with wire backing	Update fabric specifications and QPL.
EC-STR-3D	Enhanced silt fence	Standard has not been used consider voiding.
EC-STR-3E	Silt fence fabric joining details	No comment
EC-STR-8	Filter sock	Filter sock stacking not practiced. Remove detail, limit applicable slopes, revise spacing or eliminate dich application. DO not use Geohay in dich.
EC-STR-27	Temporary slope drain and berm	Min. pipe size is 15" for TDOT projects. Simplify berm details.
EC-STR-29	Permanent slope drain pipe	Standard has not been used consider voiding.
EC-STR-34	Erosion control blanket for slope installation	Hydro mulch should be considered as an alternate
EC-STR-35	Filter berms	No comment. Promote this practice.

EC-STR-37	Sediment tube	Improve staking details, limit ditch applications.

DITCH DEVICES

Drawing	Description	Comments
EC-STR-4	Enhanced silt fence check (trapezoidal ditch)	Standard has not been used consider voiding.
EC-STR-4A	Enhanced silt fence check (v-ditch)	Standard has not been used consider voiding.
EC-STR-4B	Enhanced silt fence check details	Standard has not been used consider voiding.
EC-STR-6	Rock check dam	Review rock quantity calculations
EC-STR-6A	Enhanced rock check dam	Review rock quantity calculations
EC-STR-7	Sediment trap with check dam	No comments.
EC-STR-55	Gabion check dam	Standard has not been used consider voiding.
EC-STR-56	Gabion check dam design tables	Standard has not been used consider voiding.
EC-STR-57	Gabion assembly details	Standard has not been used consider voiding.
EC-STR-58	Gabion assembly details	Standard has not been used consider voiding.
EC-STR-59	Gabion check dam general notes and component properties	Standard has not been used consider voiding.
EC-STR-61	Level spreaders	Standard has not been used consider voiding.

INLET PROTECTION

Drawing	Description	Comments
EC-STR-11	Culvert protection type 1	Remove sediment storage zone. Combine plan Views and leave more space for a placement of pipe headwall between the pipe end and rock check dam. Add pipe to title, remove type 1
EC-STR-19	Catch basin protection	Delete type E
EC-STR-39	Curb inlet protection type 1 & 2	Type 1, device has an excessive foot print. Impossible to maintain. Has not been used. Remove types. Label it as

		perimeter protection.
EC-STR-39A	Curb inlet protection type 3 & 4	Consider removing type 3, impossible to maintain. Minor modification is needed for type 4 to simplify maintenance.
EC-STE-40	Catch basin filter assembly for circular structures	Limit the use up to 72” CB
EC-STR-41	Catch basin filter assembly (type 1)	Limit the use up to 72” CB
EC-STR-41A	Catch basin filter assembly (type 1) slipcover details	Limit the use up to 72” CB
EC-STR-42	Catch basin filter assembly (type 2)	Limit the use up to 72” CB
EC-STR-42A	Catch basin filter assembly (type 2) slipcover details	Limit the use up to 72” CB
EC-STR-43	Catch basin filter assembly (type 3)	Limit the use up to 72” CB
EC-STR-43A	Catch basin filter assembly (type 3) slipcover details	Limit the use up to 72” CB
EC-STR-44	Catch basin filter assembly (type 4)	Delete – CB is too large
EC-STR-44A	Catch basin filter assembly (type 4) slipcover details	Delete – CB is too large
EC-STR-45	Catch basin filter assembly (type 5)	Delete – CB is too large
EC-STR-45A	Catch basin filter assembly (type 5) slipcover details	Delete – CB is too large
EC-STR-46	Catch basin filter assembly (type 6)	Limit the use up to 72” CB
EC-STR-46A	Catch basin filter assembly (type 6) slipcover details	Limit the use up to 72” CB
EC-STR-47	Catch basin filter assembly (type 7)	Limit the use up to 72” CB
EC-STR-47A	Catch basin filter assembly (type 7) slipcover details	Limit the use up to 72” CB
EC-STR-48	Catch basin filter assembly (type 8)	Limit the use up to 72” CB
EC-STR-48A	Catch basin filter assembly (type 8) slipcover details	Limit the use up to 72” CB
EC-STR-49	Catch basin filter assembly (type 9)	Delete, CB is too large
EC-STR-49A	Catch basin filter assembly (type 9) slipcover details	Delete, CB is too large
EC-STR-50	Catch basin filter assembly (type 10)	Delete, CB is too large
EC-STR-50A	Catch basin filter assembly (type 10)	Delete, CB is too large

	slipcover details	
EC-STR-51	Catch basin filter assembly (type 11)	Delete, CB is too large
EC-STR-51A	Catch basin filter assembly (type 11) slipcover details	Delete, CB is too large

DETAINING DEVICES

Drawing	Description	Comments
EC-STR-12	Rock sediment dam	Standard has not been used consider voiding.
EC-STR-13	Rock and earth sediment embankment	Standard has not been used consider voiding.
EC-STR-15	Sediment basin	Will be modified based on current ongoing research
EC-STR-16	Sediment basins riser and collar appurtenances	To be revised
EC-STR-17	Sediment basin embankment details	To be revised
EC-STR-18	Sediment basin floating outlet structure	No comment
EC-STR-21	Permanent riprap basin energy dissipators	Revise number and move to new series standards under energy dissipators.

IN-STREAM DEVICES

Drawing	Description	Comments
Ec-str-11a	Culvert protection type 2	Remove type 2 add perimeter. EC-STR-11 will be renamed to pipe culvert protection.
EC-STR-25	Temporary culvert crossing, construction exit, construction ford	No comment
EC-STR-30	Instream diversion (without traffic)	No comment
EC-STR-30A	Instream diversion (with traffic)	No comment
EC-STR-31	Temporary diversion channel	No comment
EC-STR-31A	Temporary diversion channel design	No comment
EC-STR-32	Temporary diversion culverts	No comment
EC-STR-33	Suspended pipe diversion (downstream)	No comment

EC-STR-33A	Suspended pipe diversion (upstream)	No comment
EC-STR-36	Turf reinforcement mat for channel installation	No comment
EC-STR-38	Floating turbidity curtain	No comment

RECOMMENDED NEW DEVICES

Drawing	**Description**	**Comments**
EC-STR-XX	Construction site delineator	NEW
EC-STR-XX	Multi stage protection	NEW

APPENDIX C

SURVEY RESPONSE

SURVEY QUESTIONS

Name
Job title, region, and/or district
Contact information Email, Phone No.

Installation

Name the types of EPSC types typically used in your region/district:
What difficulties are encountered during installation of named structure(s)?
What can be done to improve the installation efficiency of named structure(s)?
What can be done to improve the current installation practice per EPSC device?
What EPSC products are the most difficult to install in accordance to the current installation details?
How can the installation be modified to improve installation efficiency but retain the level of EPSC performance effectiveness?
What measure is consistently not installed in accordance with current installation details?
Are multiple EPSC devices designed and installed in a drainage sequence?
Does a treatment train of multiple EPSC devices improve site performance reducing erosion?
Do you have any recommendations about current installation practices?

Performance

Which products are failing once installed in accordance to the current installation details?
What products are the most effective when installed properly?
Which product's performances are not meeting the design criteria shown in the standard drawings?
What component of the device is over designed or needs improvement?
Is trenching of silt fence necessary? If so, what recommendations can be made to improve installation?
Is trenching of rolled erosion control products necessary to maintain intimate contact with soil?
Do you see any benefits in minimizing soil disturbance during the installation of such products?
How often is newly applied straw mechanically crimped or chemically tacked to soil?
Do you see the cost benefit of limiting the application of enhanced silt fence with wire backing to only steep fill or cut slope locations?
What products are preferred by contractors?
Is trenching of rock checks and enhanced rock checks necessary to improve performance of the measure?
How often is mulch applied at the specified rates per TDOT standards?
Are there any EPSC devices shown on the plans that you generally change to an alternate device in the field due to your experience with its performance? If so, please explain.
How often is fertilizer used when applying vegetation?
How often is lime used when applying vegetation?
How often seed beds are properly developed when applying vegetation?
Have you used PAM (polyacrylamide) on a project? If so, how did it perform?
Have you used Bonded Fiber Matrix?
Have you applied with seed or without seed?
How did it perform?

Did the performance justify the cost difference with typical seed and mulch?
Are they equal to or better than blankets?
Have you used Tackifiers? What types of Tackifiers are being used?
Which TDOT catch basin/area drain inlet protection have you found to perform the best?
How often is mulch applied at the specified rates per TDOT standards?
Are there any EPSC devices shown on the plans that you generally change to an alternate device in the field due to your experience with its performance? If so, please explain.
How often is fertilizer used when applying vegetation?
How often is lime used when applying vegetation?
How often seed beds are properly developed when applying vegetation?
Have you used PAM (polyacrylamide) on a project? If so, how did it perform?
Have you used Bonded Fiber Matrix?
Have you applied with seed or without seed?
How did it perform?
Did the performance justify the cost difference with typical seed and mulch?
Are they equal to or better than blankets?
Have you used Tackifiers? What types of Tackifiers are being used?

Maintenance

Which EPSC products are the easiest to maintain?
Which EPSC products are the most difficult to maintain?
Do you have any recommendations to improve or eliminate maintenance activities?
Are there products that seem to cost too much but perform superior to others?
From your perspective, is it possible to reduce the frequency of inspection?
What do you consider as the most difficult maintenance technique?
Would there be a benefit to having a separate line item for maintenance of EPSC devices? Please explain.
Do you feel that the estimated quantities for EPSC items generally include an adequate amount for maintenance and replacement? Please explain.
Is the EPSC device installer typically responsible of maintaining the devices? Whether yes or no, please describe the pros and cons.

Plans Accuracy

Are there any devices in which the tabulated quantities do not match the plans?
Do you have any other recommendations to modify the current practices?
Are there times when devices are not accurately depicted on the plans?
Are there times when useful EPSC devices/measures are not included as items on the plans? If so, please describe.
Are there any EPSC devices, which TDOT has a standard drawing for, you never use? If so, please describe.
Do designers properly utilize EPSC devices according to conditions shown on site plans?
Are stream diversions being shown on the plans and are they the appropriate type for the field conditions/terrain?
Are sediment traps being shown on plans where needed? How often do you add sediment traps as a revision to your SWPPP in the field?
How often do you use sediment basins as shown on TDOT standard drawings?

How much accuracy should be expected of the EPSC plans and quantities without knowledge of a contractor's construction phasing?
Do you find that construction phasing and grading substantially affects the actual area draining to a device in contrast to the drainage areas on the plans that the EPSC measures were designed for? If so, how do you adjust for that?

Other

Is there any specific training that you would like have?
Are there devices that you have used on non-TDOT projects or that you have come up with on your own that you think would be beneficial for TDOT to review?

Survey Responses

Name the types of EPSC types typically used in your region/district?

Silt fence, silt fence with backing, sediment tubes, rock check dams, enhanced rock check dams, filter bags, temp stream diversion channels.
Sediment tubes, rock check dams, straw wattles, outlet protection, inlet protection, silt fence.
Gabion Check Dams, Rock Checks, Enhanced Rock Checks, Sediment traps with Check Dams, Silt Fence, Silt Fence Backing, Level Spreaders, Curb inlet protection Types 1, 2, 3, 4, Catch Basin protection 1, 2, 3, 4, Catch Basin Circular structures protection, Catch Basin Protections types 1-11, with some slip cover types, Filter Berms, silt/filter sock, sediment tubes, slope drains, ECB Erosion Control Blanket, Dewatering Structures, Sediment Filter Bag, Rock Sediment Dams, Rock basin Energy Dissipator, Sediment Basins, Turbidity Curtain, Coffer dams, Instream Diversions, Suspended pipe diversions, Diversion Channels, TRM Turf Reinforcement Matting, Culvert Protection Type 2, Crossings and Construction Entrances and Exits TCE.
Silt fence, check dams, sediment traps, geotextile, seeding and much, sod, stream diversions.
Rock check dams, enhanced rock check dams, filter sock, silt fence, silt fence with backing, temporary berm, turf reinforcement mat, erosion control blanket, sediment filter bag, temp slope drain.
Rcd, ercd sediment tube, silt fence, silt fence w/b, geotextiles, blankets, etc.
Silt fencing, silt fencing with backing, sediment tubes, Rock Check Dam, Enhanced Rock Check Dam, Sediment Filter Bag, Polyethylene Sheeting, Temporary In-Stream Diversion, High-Visibility Construction Fence, Geotextile Type III Erosion Control, Water, Sodding.
Silt Fence, Silt Fence with Backing, rock checks, and enhanced rock checks
Sediment Tubes, Silt Fence w & w/o backing, High Visibility Fence, Enhanced Rock Check Dam, Rock Check Dam, Filter Assembly, curb inlet protection, culvert protection type 1, suspended pipe diversion, stream diversion, sediment trap, slope drains, berms,
Sediment tubes, silt fence, check dams.
Level 1
Silt fence, sediment tubes, check dams
Sediment tubes, silt fence, silt fence with backing, rock check dams, and enhanced rock check dams
Don't know.
Silt Fence, Sediment Tube, Enhanced Silt Fence, Rock Check Dams, Culvert Protections, Catch Basin Filters.
N/A

Silt fence
The most typical EPSC measures are: 1. Silt fence & Silt fence with backing 2. Check dams including both rock structures and manufactured products 3. Construction entrances 4. Storm water inlet protection.
All
Silt fence, rock check dam
Silt fence, check dam, enhanced check dam, straw wattles, construction exits, inlet protections
Discussion
The most common EPSC devices used on TDOT projects are, Silt fence, Silt fence with wire backing, Rock check dam, and Enhanced rock check dam. Evaluate CB filter assembly.

What difficulties are encountered during installation of named structure(s)?
Topography elevations and rock near bridge jobs, improper placement and installation by contractor subs.
As a QA Auditor, I am typically not on-site when the EPSC measures are installed.
Compliance with STD drawings in applications by TDOT staff (Construction Maintenance personnel). Some applications require site specific changes in STD installs that may not follow STD requirement. These site specific applications differ from STD yet end result is compliance, creates some confusion by regulatory/consultant inspections of projects as non-compliance issues per TDOT follow the STD requirements. Contractor knowledge of the STD and application requirements of many of the products. Alternative or Equivalent BMP per QPL and knowledge of Manufacturer's installation requirements, sometimes confusion in what part of STD is applied to such BMP installation vs Manufacturers requirements.
Always protect the streams.
I don't install them, so I am not sure.
N/A
Sometimes it is difficult to know exactly where to place a silt fence.
Rock during trenching of silt fence
Construction Question
Require manual labor/does not get installed properly
None
Rock, sub-contractors installing items want to be able to do it all mechanically instead of by hand in difficult areas, notches not placed correctly in checks
Contractor not installing to standards
N/A
N/A
Getting contractors to install correctly
1. Silt fence is sometime shown on plans in locations where it will be obliterated as soon as construction is initiated. It is also sometimes located on plans such that it is not on contour or proper installation of J-hooks is not indicated. 2. Check dams, both rock and manufactured, are many times installed without a wide enough cross-section in the flow path and/or with the outer ends higher than the obvious high flow level of the waterway. This is probably due to the fact that they are generally paid for with a “per each quantity”. 3. The rock specified is impractical. The rock as sized will lodge between the tandem wheels of standard over-the-road dump trucks and create a road hazard. 4. Wooden box type are impractical for installation under traffic situations.

Amount of right of way available, steep slopes.
Along contour, trenching.
Not properly trenching silt fence, not building check dams with the middle lower than the sides.
Discussion
General Installation issues such as following contours or trenching silt fence. Investigate installation (depression side extensions) and rock quantities for rock check dams.

What can be done to improve the installation efficiency of named structure(s)?
Adequate oversight of subs doing the install to correct errors when subs are still onsite, too hard to get the subs back to correct install issues.
Not Applicable
Maybe require certification process for a compiled list of TDOT Certified EPSC BMP Contractors that can work on TDOT projects. Require TDOT personnel that pay for and dictate the use of such BMPs for EPSC the same TDOT certification, previously noted. Contractor certifications of BMPs used for TDOT projects, Engineer knowledge base on TDOT used BMP for TDOT projects and personnel working on TDOT projects understand that no payment will be given for inappropriately installed BMPs or if end product of BMP is not performing the intended result of no sediment/turbidity issues in waters of State or off of project. Include the changes as indicated by Engineer on projects, will require Contractor and Engineer to work together on same goal to keep compliance if payment is not awarded until measure(s) have proven to maintain compliance on the project as whole.
More silt fence and check dams
n/a
Following the stand drawings
I am unsure. It may not be an easy problem to solve.
Contractor installing correctly
Construction Question
Find a product that does not require manual labor
Nothing
Don't pay for them if not installed correctly
Install per standards
N/A
N/A
Train contractors
The simple answer is: Improved supervision with qualified personnel.
No suggestions
Using trenching equipment
Discussion
Improved supervision with qualified personnel. Train contractors. Require certification process for a compiled list of TDOT Certified EPSC BMP contractors. Understand that no payment will be given for inappropriately installed BMPs.

What EPSC products are the most difficult to install in accordance to the current installation details?
Filter bags, temp stream channel diversions, silt fence with backing.
Not Applicable.

All have their niches. In stream diversions, to separate flowing water from construction activities is the one questioned frequently if not in design or construction plans. The sizing of and layout of in the plans is always open to interpretation if not in design/construction plans. STDs assist yet difficult based on high water flows and changing capacities of STR dependent on rain events that occur. Limited on increasing of such a BMP too site specific.
Stream crossings
N/A
N/A
I am unsure.
Silt Fence in general
Construction Question
Check dams
Unknown
Erosion control blanket - hardly anyone keys it in correctly and too many times the ground is not leveled enough to maintain contact with the blanket thus you get rilling underneath
Check dams (rock and tubes)
N/A
N/A
Sediment basin outlet structures.
Check dams and enhanced check dams.
No suggestions.
Depends on site and accessibility to the measure.
Sediment tubes typical are not entrenched as shown on the standard drawing.

Discussion

In stream diversions are had to install. If it is not shown on plan set hard to design. Erosion control blankets are not keyed. Sediment tubes are not trenched.

What can be done to improve the current installation practice per EPSC device?

Better training of subcontractor and contractor personnel to understand the EPSC device function and layout position
Not Applicable
TDOT Certification process of Contractors and TDOT Personnel to be able to install BMPs on TDOT Projects. Payment in lump sum of all BMP use per phase of SWPPP if compliance was maintained meaning no loss of turbidity and sediment per each EPSC phase of project in lieu of payment per installation of each BMP with holding correct installation or effectiveness as currently done.
Watch job during rain to see if erosion measures are working
N/A
Follow the standard drawings
I am unsure since I don't work in the field.
Contractor install correctly
More visual inspections
Do not pay for items not installed per standard specifications
Check it more often
More education and less acceptance of improper installs
Contractor taking the time to install correctly

N/A
N/A
Train contractors
Improve supervision
Better selection of devices for particular applications and better supervision during installation
Proper inspection

Discussion

Better training of subcontractor and contractor personnel. Payment in lump sum of all BMP use per phase of SWPPP. Better selection of devices for particular applications. Do not pay for items not installed per standard specifications.

How can the installation be modified to improve installation efficiency but retain the level of EPSC performance effectiveness?

Not Applicable
Include worst case scenario in the design calculations for diversion in STR and allow more space ROW to adequately accommodate the BMP and staging of work that can occur in the construction.
Make sure measures are installed correct
N/A
N/A
Maybe some more education as to proper installation techniques could be offered.
Make sure there is an alternative if rock is encountered during trenching
Construction Question
Take more pride in work
I don't know, mainly just make sure they are being installed per current standards
N/A
N/A
Use tighter survey/measuring controls
1. Silt fence should be understood before installation to be located at clearing limits (eg. a few feet beyond the toe of slopes) or at ROW if the project is to be cleared to ROW. Where silt fence is shown on plans running counter to contours, it should be installed in a J-hook fashion.
2. Check dams must, to be effective, must be installed must be with a wide enough cross-section in the flow path and with the outer ends higher than the obvious high flow level of the waterway but keeping in mind that it does no good to install a 3 foot high check dam in a 2-foot deep ditch.
3. Construction entrances of necessity should be constructed with larger stone and covered with some smaller stone when primary use is for small truck and automobile traffic.
4. Storm water inlet protection devices proliferate the market. They just need to be specified.
No suggestions

Discussion

Rock check dam height based on dich depth. Develop a J hook detail. Better categorization of storm water inlet protection devices. Alternative if rock is encountered during trenching. ROW to adequately accommodate the BMP.

What measure is consistently not installed in accordance with current installation details?

Filter bags assemblies

In my limited experience, I have found that EPSC measures are consistently installed correctly.
Temporary crossings, Silt Fence, SFB Silt Fence Backing, Rock Checks and ERC Enhanced Rock Checks (weir height, use of geotextile, areas of concentrated flows)
All measures are installed correct
N/A
Enhanced rock check dam
Unsure
Rock checks
Silt Fence
Sediment tubes
Silt fence
Erosion control blanket
Check dams
N/A
N/A
Installing devices at correct elevation
1. See 2, 3 & 4 above.
Silt fencing
No suggestions
Check dams
Sediment Tubes, Check dams, Mulch Filter Berms. QPL products – the manufacture's installation drawings/instructions which when the product is placed on the QPL need to be readily available during construction.

Discussion

Check dams, Erosion control blanket. The manufacture's installation drawings/instructions which when the product is placed on the QPL need to be readily available during construction.

Are multiple EPSC devices designed and installed in a drainage sequence?

Yes
Yes.
Majority of cases yes, dependent on amount of ROW (space available to appropriately implement). All EPSC BMPs that TDOT has or applies require multiple installation in drainage sequence. Slow the velocity or "meter" the amount of water reaching perimeter BMP to prevent overwhelming of outer BMP and allow sediment to fall out of suspension.
Yes
N/A
Yes
Unsure
Typically yes
Sometimes
Yes
Yes
Yes
Most of the time
Yes
N/A

Yes
Absolutely this is true. Multiple EPSC devices should be installed from higher to lower elevation in order of treatment of wider flow area to more concentrated flow and hopefully with an area of less slope toward the end of the sequence. Ditches filled with various sized rock and chips from clearing have proven effective.
Yes. Projects require that on occasion.
Yes
Yes
Most EPSC plans show EPSC devices in a sequence.
Discussion
Yes.

Does a treatment train of multiple EPSC devices improve site performance reducing erosion?
Yes
Yes. Areas that have multiple EPSC devices typically perform better than single device areas.
Overall and in most all cases YES! Treatment train or series of BMPs is the most effective when areas in the series allow for "stalling" allowing sediment to drop from suspension integrated in the treatment train. Most effective in phase one of the project. When excavations change elevations limits the amount of area available for stalling and multiple measures. Increases the need for quicker stabilization (sod) in majority of cases.
YES
I believe so.
Yes, in most cases.
Maybe
Typically yes, if installed correctly
Construction Question
Yes
Not all the time
Definitely
Yes, what sediment is not caught upstream can be caught by other measures before leaving the job
Yes, when done according to plans
N/A
Yes
The only way to prevent erosion is with some form of ground cover such as seeding with mulch or erosion blanket, etc. or some form of stone application. Proper “tracking” of slopes will reduce erosion but is not nearly as effective as temporary seeding with mulch or just temporary mulching which is not applied nearly as often as it is warranted. The idea that we can “just wait until where’re ready for permanent seeding” has in the past created several bad results. An ounce of erosion prevention is worth a pound of sediment control.
Yes but they must all be installed properly and maintained
Yes.
Yes
Sometimes. West TN has soils that stay suspended in water longer and do not always filter
Yes, if sufficient right-of-way is available to install the treatment train as shown on the plans.

Discussion
Yes.

Do you have any recommendations about current installation practices?
Not Applicable
Would be beneficial for TDOT site engineers on projects to be more aware of STD of installation of the BMP EPSC. Then to monitor the installation more closely. Especially at the beginning of the project to set expectations of the project with the Contractor as how expected to install. The more consistently this is monitored with contractors the better installation across the State on TDOT projects will become as these Contractors work multiple projects. Difficult to argue the way installed when Contractor has been paid for poor installation not meeting STD.
Always install erosion measures correct
N/A
Follow the standard drawing!
No
Just make sure they are installed according to the specification or don't pay for it.
No
Don’t allow use of sediment tubes they are not installed correctly used incorrectly and don't work Effectively.
None
Mainly just encourage the contractor to take the time to install the measures by the standards.
N/A
N/A
No
Improve supervision with qualified personnel
EPSC measures need to be more of a priority for contractors
No suggestions.
Discussion
Encourage the contractor to take the time to install the measures. Need to be more of a priority for contractors. Contractor has been paid for poor installation.

Which products are failing once installed in accordance to the current installation details?
Geo hay check dams
I find that silt fence is the most common measure to fail. Silt fence also seems to be the least maintained measure on site.
Sediment tubes (needs series of in ditch applications, spacing not in ditch applications needed)
All measure work when installed
N/A
Unless overwhelmed by a storm event, no measure should fail if installed correctly.
Most probably work properly if they are installed properly.
Depends on the situation but geo hays typically fail the most
Sediment tubes, silt fences, regular SF,
Sediment tubes
N/A
N/A
Silt fence

Most all products work fine when installed in accordance to the current installation details. In fact some of the current installation details are over complicated. The problems that arise are in the translation to installation. You can't paint by numbers if you can't count.
Any can fail with poor installation.
Silt fence
Discussion
Geo hay, sediment tubes, silt fence. Most all products work fine when installed in accordance to the current installation details.

What products are the most effective when installed properly?
Silt fence with backing, enhanced rock check dams
Rock check dams
Rock Check Dams and Enhanced Rock Checks in series or multiples with additional sumps or sediment traps.
Silt fence and check dams
I have seen filter socks in ditches work better than rock check dams for retaining silt/sediment.
Geotextiles, Silt Fences, ERCD's
Probably rock check dams, silt fences, and sod.
Check dams
Check dams
Check damns
SFB
Enhanced rock check dams
N/A
N/A
Sediment basins
All of them
If chosen for the right application all measures in the standards are effective.
Enhanced rock check dam
Enhanced Rock Check Dam
Discussion
Enhanced Rock check dams.

Which product's performances are not meeting the design criteria shown in the standard drawings?
Silt fence. Probably more of a maintenance issue though.
Sediment tubes current STD in Ditch applications do not require to be in series.
None
N/A
N/A
Unsure
N/A
Silt fences
Accepted alternative check dams
Sediment tubes
N/A

N/A
Silt fence
Manufactured check dam material known as Geo-Hay.
No suggestions
Discussion
Sediment Tubes and Silt fences.

What component of the device is over designed or needs improvement?
Weight and stability in ditch applications to be stable. Easily corrected when placed in series and double up on staking.
NONE
N/A
N/A
Unsure
None
The method of holding the sediment tubes in place
N/A
N/A
None
Just quit using the product altogether.
No suggestions
Discussion
Sediment tube staking, installation.

Is trenching of silt fence necessary? If so, what recommendations can be made to improve installation?
Yes, require trenching of ditch instead of digging with bucket
Yes depending on the location within the watershed
Yes, automated or mechanical trenching installation unit that creates trench and installs fence with one pass
YES
Trenching of Silt fence with backing is necessary to a minimum depth of 6".
Yes, follow the standard drawing.
Yes. Unsure
Yes, make sure that the contractor is installing correctly
Yes
Unknown
Yes, add j-hooks
Yes, trenching machines seem to work well when you can use them versus doing by hand
N/A
N/A
Yes, train contractors
Yes it's necessary and it should be insured that it is accomplished when the silt fence is installed or in some cases where it is impractical to trench the silt fence in, sediment tubes or similar should be installed at the base of the silt fence.
Yes, light hand compaction of the trench material will help stability

Yes.
Yes
Yes
Yes trenching of silt fence is necessary to prevent the sediment laden storm water from flowing under the silt fence.

Discussion

Yes, trenching is necessary, do not allow plowing or bucket trench excavation methods, and add j-hooks.

Is trenching of rolled erosion control products necessary to maintain intimate contact with soil?

Yes, it greatly helps
Yes
No, yet dependent on velocity of drainage controlling. If the tubes and filter sock, silt worms are trenched in 2" depth with geo textile and staked velocity is high of water controlling. Not trenched for applications of where sheet flows are to be maintained.
YES
N/A
Yes, it prevent undermining at the top of the slope.
I do not believe so
Not if it is correctly pinned to the slope
Yes
Yes
Yes
Yes, especially on the upstream end
N/A
N/A
No experience
I have never believed that it did much good for the trouble it takes. Better to get it installed in a timely fashion.
No, proper staking is adequate
Yes
No
Yes
Yes trenching of rolled erosion control products (RECP) is necessary to keep the RECP from being dislodged when storm water flows across it. Preparation of the ground surface prior to placing the RECP to achieve intimate contact with the soil is paramount. Observations of successful RECP installations on slopes where the RECP has been rolled out for a generous (usually >10 feet) back from the top of the slope and where there is no concentrated flow being directed to the top of the slope have been made. Therefore, providing sufficient "run out" distance back from the top of slope might be considered in lieu of trenching.

Discussion

Mixed feedback. Improving installation to have a better soil contact is needed.

Do you see any benefits in minimizing soil disturbance during the installation of such products?

Yes, trenching of ditch disturbs less soil vs digging with bucket equipment or ripping with plow
No. If your EPSC measure isn't installed with adequate contact with soil, you will lose more soil than if it was trenched initially.
Yes the more vegetated and less disturbed the surrounding the less to control and treat. Overall less measures save money and creates vegetative buffers that assist with sediment control and erosion prevention overall.
YES
N/A
Yes, an ounce of prevention/pound of cure.
Yes. The less soil disturbance, the less erosion.
Yes, stabilization would presumably occur faster with the less disturbance
Yes
In most cases
Definitely
Yes it is always best to minimize soil disturbance
N/A
N/A
Yes, much benefit
Not particularly if the disturbance is primarily kept on the up gradient side of the installation and all loose material is tamped back down.
Yes.
Yes
Yes
Yes minimizing soil disturbance is the best to prevent erosion. However, RECPs need to be installed on a prepared rather smooth surface to maintain the intimate contact.
Discussion
Limit trenching practices do not allow digging with bucket equipment or ripping with plow.

How often is newly applied straw mechanically crimped or chemically tacked to soil?
Never
Once in the 3 projects I have worked on.
Rarely if any, Crimping requires mechanical means and use in most cases the dozer is pulled away from earth moving needs (payed more for earth work than crimping/stabilizing slopes), limited options for chemical and cost of chemical tacks keeps this option from consideration in most cases.
MECHANICALLY CRIMP ALWAYS
N/A
At application
Unsure
Very little/never
Very little
Once during job
Never
I have never seen any done this away on a job.
N/A
N/A

Never
Very seldom. The personnel applying the straw usually don't have a tracked machine.
Not often
No suggestions
Discussion
Practice needs improvement in field.

Do you see the cost benefit of limiting the application of enhanced silt fence with wire backing to only steep fill or cut slope locations?

Maybe some, however silt fence with backing will last most of the project timeline if maintained and properly installed vs regular silt fence that needs to be fully replaced usually after 1 year
Yes, if you can utilize multiple lower cost EPSC measures in its place
Yes but should always be used for BMP for STREAM and WETLAND protection measures. In most cases bridging these features at STR will require rise in approaches with fill slopes at STR and Abutments. Same is true with WTL crossings with fill slopes. Limited need for cut slopes unless near STR or WTL.
Steep slopes need silt fence with backing is needed
N/A
No, it should also be required at streams at wetlands.
Yes
Yes
Yes
No
No
It costs more than silt fence but last longer and is stronger.
N/A
N/A
Yes
In TDOT Specs "enhanced silt fence" and regular "silt fence with backing" are two different things. Silt fence with backing should be used where necessary – steep slopes or not – depending on what is on the down gradient side of the fence, i.e. waters of the state, etc. Depending on the situation it is at times necessary for its structural qualities, for example when dirt clods or larger rocks tend to roll down fill slopes.
Yes but it needs to be used adjacent to waters of the state as well
Yes.
Yes
I think silt fence w/b should be used more. It works better to retain soils
Yes. Enhanced silt fence should be removed from use in concentrated flow applications.
Discussion
It lasts longer. Need to investigate the practice of using this device close to water.

What products are preferred by contractors?
Sediment tubes
Filtrexx Socks, Straw wattles, straw mulch

SFB Silt Fence Backing, longevity of BMP if placed correctly can last most all phases of project.
Sediment tubes quick and easy fix measure.
Silt fence and slope drains
n/a
Silt fences, geotextiles.
Unsure
Silt fence with backing, rock checks
Silt fence
Sediment tubes (anything they can put out quickly)
N/A
N/A
Cheap under designed products
Whichever products create the least delay and make them the most money.
Inexpensive products
No suggestions
Straw wattle
EPSC devices that utilize rock are preferred by contractors.
Discussion
Rock check dam and, Sediment tube

Is trenching of rock checks and enhanced rock checks necessary to improve performance of the measure?
No, as long as they are installed to prevent bypassing and have a proper weir
No, as long as it is installed properly
No as long as it is Rip Rap! Equivalents probably due to weight differences and stability concerns in high velocity of concentrated flow applications.
YES
N/A
Yes!
No
Yes, this allows for the undermining of the check
No
Yes
Would help
Yes to prevent undercutting.
N/A
N/A
No
Yes
Yes
No. There is a study Auburn University did on this topic.
Yes
No.
Discussion
Mixed feedback but NO

How often is mulch applied at the specified rates per TDOT standards?
Never
Unknown
Varies usually lower than specified. Cost of straw, multiple re-application but if paid for temporary mulch with every application explains why not crimped or tacked. Sometimes the availability of straw/mulch growing year dictates cost and availability of straw. High cost and availability of dictates the application rate for that season on some projects.
Very often
N/A
As often as needed to maintain coverage.
Unsure
I would assume very often
Most of the time
Once
Seldom
Not too often.
N/A
N/A
Never measured
About 25% of the time.
No suggestions
Most of the time it is unless the inspection request something different
Not often. It is difficult to visually determine the application rate. Possibly have a handbook that contains photos of various application rates.
Discussion
Seldom, practice needs improvement in field.

Are there any EPSC devices shown on the plans that you generally change to an alternate device in the field due to your experience with its performance? If so, please explain.
Erosion eels perform better than Geohay and sediment tubes
Not Applicable
QPL equivalents if the use of the BMP equivalent is not producing outcome as the original produced.
EPSC MEASURES PUT IN AS PLANS SHOW
N/A
RCD's to sediment tubes in the event of sodding in the next couple of days.
Unsure
Not at first, but contractor usually likes to change to geo-hay rather than rock check
No
Unknown
Rock check dams to sediment tube check dams
N/A
N/A
No
I never use the wood and wire fabric “chicken coops” for storm water structure protection. They are just too much trouble and are not feasible under traffic.

No suggestions
EC-STR-3D, EC-STR-4 & 4A. Rock check and Enhanced Rock Checks are easier to install and maintain than the Enhanced silt fence checks. Enhanced silt fence checks should be removed from use in concentrated flow applications.
Discussion
Limit the use of CB inlet protection, especially for large structures. Delete Enhanced silt fence checks for dich applications. Set up short-term dich check application with sediment tube.

How often is fertilizer used when applying vegetation?
Only when the contractor has to vegetate an area near end of project
Unknown
Dependent on existing soil condition and if top soil available on plans. Lately majority of projects have used sod as final stabilization. Fertilizer is used, yet application rates are questionable.
VERY OFTEN
N/A
Every time.
Unsure
Truthfully I would assume very little
Most of the time
Unknown
I do not think very often.
N/A
N/A
Always
I believe most reputable seeding subcontractors apply some fertilizer when seeding large areas. So it's probably about 50% of the time.
No suggestions
All the time
Discussion
Mixed feedback. Practice needs improvement in field.

How often seed beds are properly developed when applying vegetation?
Not very often
Unknown
Very often
N/A
Sometimes (Not Enough)
Unsure
In the last few years I would say this has been going on regularly.
60/40
Unknown
Not often enough
Not too often.
N/A
N/A

Always
Not very often because the grading contractor is preparing the ground and a seeding sub is applying the vegetation. The seeding sub is probably not going to complain to the prime unless the preparation is awful.
Could be improved
Discussion
Practice needs improvement in field to use often.

Have you used PAM (polyacrylamide) on a project? If so, how did it perform?
Yes, not very well due to settling area and improper application rates
Never used
No
N/A
Yes, very well.
No
No
No
No
Yes, the gel logs are not great but other works well
No
N/A
N/A
No
Yes. And there are very particular cases where nothing else will accomplish the necessary treatment. I think it should be used judiciously because you can end up spending 90% of your money to cure 10% of the problem. It must have contact time with storm flow and settling time after contact. It generally takes more than advertised.
No suggestions
Yes. It did not perform as well as we would have liked, we ended up using another product
Discussion
Practice needs improvement in field to use often.

Have you used Bonded Fiber Matrix?
Yes
No
No
N/A
No
No
Yes
No
No
Yes
No
N/A
N/A

No
Yes
No suggestions
Yes we have performed TDOT Quality Assurance Audits for projects that have utilized bonded fiber matrix.

Discussion
Limited use. Explore how to expand the use.

If you used Bonded Fiber Matrix, have you applied with seed or without seed?
With seed and it worked great
Not Applicable
N/A
N/A
N/A
No
With seed
No
With
No used
N/A
N/A
N/A
I have always used with seed because the TDOT spec paid for it that way.
No suggestions
With seed.
Discussion
Limited use. If used seed is applied.

If you used Bonded Fiber Matrix, how did it perform?
Really good, however on steep or vertical slopes it sloughed due to vegetation and water weight
Not Applicable
Well, impressed with ability to hold to different slope rates. Fertilizer, seed, water and structual fiber works very well with one application. If used need to include a quick germinating seed to quickly stabilize application on steeper slopes. Have seen in rill out waiting on seeds to root and germinate if not applied during window where rain chances are low. Costly so the fewer applications, no reapplications for cover in not germinating quickly enough creating additional costs
N/A
N/A
N/A
NA
In most areas very good, only been few instances where it did not take.
Unknown
Pretty well
Not used

N/A
N/A
N/A
Very well if applied in sufficient amount per unit area and care was taken to eliminate gaps in coverage.
No suggestions
The bonded fiber matrix performed well.
Discussion
Positive experience explore how to use more.

If you used Bonded Fiber Matrix, did the performance justify the cost difference with typical seed and mulch?
Yes, did not have to reapply seed due to washing away
Not Applicable
Yes on a case by case basis. Where not safe to stabilize with seed mulch are other conventional methods that make application of seed mulch limited to impossible
N/A
N/A
N/A
NA
There is no cost difference for the department as it is paid per matting and seed.
Unknown
If used in the right situation
Not used
N/A
N/A
N/A
I only remember using it when it was not possible to apply seed and blanket.
No suggestions
The cost of bonded fiber matrix is justified when used on steep slopes and areas difficult to place typical seed and mulch and erosion control blankets.
Discussion
Yes the cost is justifiable. Especially at locations with limited access.

If you used Bonded Fiber Matrix, are they equal to or better than blankets?
Better
Not Applicable
Better, primarily the seed is bonded or attached to the slope or soil shere applied. Blankets do not have bond to seed and seed will sometimes wash out underneath the blanket.
Blankets work great
N/A
N/A
NA
I prefer this as you can see the result usually quicker
Unknown
Yes as long as they don’t break up

Not used
N/A
N/A
N/A
Yes
No suggestions
Bonded fiber matrix could be used in area difficult to access for blanket install.
Discussion
Quick results and easy application

Have you used Tackifiers? What types of Tackifiers are being used?
No
No
Yes, petroleum based tacks only. No resins only seen once cost prohibitive.
NO
N/A
Yes, asphalt emulsion
No
No
No
No
N/A
N/A
N/A
Very seldom.
No suggestions
No.
Discussion
Very limited use. Explore how to expand the use of Tackifiers.

Which TDOT catch basin/area drain inlet protection have you found to perform the best?
Most do ok but the EC-STR-40 series does good but contractors hate them due to constructing
Filtrexxx Socks and Domed Drop inlet protectors
EC-STR-19 Type A Section C-C Mineral Aggregate use
Sediment tubes
N/A
Silt savers
I do not have much experience in this area
Silt savers if installed correctly
The ones made with 2x4" the dome ones wear out on long time bases
Unknown
Filter assemblies - silt savers
I think the silt saver devices perform well when installed properly.
N/A
N/A
Premanufactured devices

Silt savers work well and the TDOT Standards on EC-STR 11, 19, 39 and 39A (for under traffic situations) work well.
Curb Inlet Protection types 1 and 2 and slip cover filter assemblies
U end wall
They all work, but depends on the drainage area to each structure
EC-STR-19 Type E does not meet the current TDEC EPSC manual.

Discussion

Remove Type E from EC-STR-19. Others devices are working well. Limit the field installation time for generic CB assembly standard.

Do you have any recommendations about performance of EPSC practices?

No
Use of more detention on projects yet this will increase room needed for ROW. Series of BMPs with detention integrated in first two phase works very well to prevent overwhelming of outer measures and overall turbidity. Increase the need monetarily for final stabilization of disturbed areas as possible will prevent over expenditures of additional BMPs (multiples etc.) from needing to be used.
Always install EPSC measure correctly
N/A
N/A
No
Do not like sediment tubes for check dams
No
I think having the contractor install the devices correctly and also temporary stabilizing the work area quickly and often are big helps.
N/A
N/A
No
Schedule to install sediment control measures before they are critical by constantly surveying the forecast construction events and ascertaining the area, slope and flow path of anticipated storm flow from areas to be disturbed (project where the water is going to go).
Provide erosion prevention measures at the earliest possible time.
The standard measures work if installed properly and used for the right applications.

Discussion

Explore how to use sediment basins often since they allow contractor to perform construction phasing freely. Remove sediment tubes from ditch applications.

Which EPSC products are the easiest to maintain?

Silt fence with backing and check dams
Rock Check Dams
Silt Fence Backing Silt Fence
Silt fence
N/A
Silt fence / geotextile
Rock Check Dams
Silt fence

Check dams and silt fence
Unknown
Silt fence with backing
N/A
N/A
Unknown
No suggestions
Silt fence
Discussion
Silt fence with wire backing and rock check dams.

Which EPSC products are the most difficult to maintain?
Regular silt fence, geo-hay
Silt Fence
Sediment Traps Basins
Rock check dams
N/A
ERCD's
Silt fences
Geo-hay, silt savers, and sediment filter bag
Unknown
Rock check dams
N/A
N/A
Unknown
Ponds
Check dams
EPSC products that are installed without sufficient access to maintain them are difficult.
Discussion
Interesting respond when compared to previous question's results.

Are there products that seem to cost too much but perform superior to others?
Hydro mulch
Filtrexxx Socks
Rock Checks, Enhanced Rock Checks, Silt Fence Backing
Yes
N/A
N/A
Unsure
Rock checks vs geo-hay, rock checks are better
Unknown
I am not sure about the costs.
N/A
N/A
Unknown
No suggestions

Discussion
Rock check dams.

From your perspective, is it possible to reduce the frequency of inspection?
No, because most contractor only care about moving dirt not maintenance of EPSC
Yes
Yes the quicker stabilization (FINAL) with the use of sod on disturbed areas the quicker the EPSC inspections can be reduced or eliminated, leaving only roadway surface work, signage, marking etc.
Yes
I guess it is possible, but not advisable. I have seen EPSC measures that have gone a while without being maintained.
No
It depends on the frequency of rain in the area of the project
Yes, depending on the weather on the project and type of work
Depends on the project and exposed area
No
Depends on the project and site
No I think knowing the measures will be inspected regularly makes the contractor do a better job keeping them installed and working properly.
N/A
N/A
Probably not
No, I believe an EPSC inspector should be on site at all times on linear projects and projects disturbing greater than 5 acres.
Yes
No. A minimum of twice weekly inspections are necessary to make sure EPSC devices are maintained and adjusted to changing drainage patterns as construction progresses.
Discussion
Inspections are needed not only to monitor the performance of the device (stable and cleanout) but mostly to address dynamic changes within the construction area.

What do you consider as the most difficult maintenance technique?
Cleaning out sediment traps or basins
Keeping silt fence maintained due to typical large amounts of the measure on site
Consistency in performing maintenance, especially when BMP is not effective and requires routine maintenance.
Temporary stream crossing
N/A
Sediment removal
Unsure
Cleaning rock checks depending on the amount of cleaning
Unknown
Cleaning out sediment behind check dams
N/A
N/A

Unknown
No suggestions
Dewatering of devices is difficult.
Discussion
Sediment removal.

Would there be a benefit to having a separate line item for maintenance of EPSC devices? Please explain.
Yes, would improve contractor effort more if he knew he was getting paid for it
Yes. More accurate accounting. It would also provide insight to how much time is actually spent on maintenance.
No it would become wordy making the attention to detail become time consuming. Short too point be specific. If part of the contract then lump sum it.
No
N/A
Yes, being able to establish between required installation and maintenance
Unsure
If they lowered the cost of the items then yes, but if not then there wouldn't be any benefit
It would be on a large project hard to keep up with an item for EPSC maintenance now the contractor is responsible for maintaining an item. the inspector can tell him to fix it and he will if you have an item i can foresee some contractors changing items out on a regular basis without the inspectors knowledge.
Unknown
Yes, then the sub-contractors or prime would be much more likely to do it.
It may give the contractor a reason to keep measures in good shape if they think they will be paid for doing this.
N/A
N/A
Yes, it's always better to pay someone for work done.
I don't believe so. I think that would just add confusion to the bidding process. The contractors need to be educated on the maintenance and installation practices
No suggestions
No as long as pay items are provided to pay for items to be replaced.
Yes when maintenance of devices is included in the cost of the EPSC device there is not incentive for the contractor to perform the maintenance.
Discussion
Consider to pay maintenance separately.

Is the EPSC device installer typically responsible of maintaining the devices? Whether yes or no, please describe the pros and cons.
About half the time, if contractor maintains the devise it will get done a lot faster than EPSC subcontractor
Yes. The pros of this is that the contractor is intimately familiar with the measure and its placement but the downside to this is when you get a bad contractor, they may not be very responsive to maintenance requests.

Usually, yet varies so yes and no. Pros one contact and can do all. Con cannot keep up with multiple demands of large projects than Prime contractor who is on project 24/7. Quicker response if Prime is the maintainer of the BMPs and can implement some measures on an as needed basis. So Prime overall needs to be responsible for all and held responsible for all. Sub agreement between Prime and that contractor. TDOT deals with Prime and ultimately should be holding prime responsible.
Yes
N/A
Yes
Yes
Typically yes, but in some instances where the installer is further away and doesn't have local forces then another contractor usually does the work
Yes, pros is the inspector can keep up with the repairs normally the EPSC installer only fixes them when they are directed to. Cons is the inspector normally has to tell them to fix or maintain an item.
No, it is everyone responsibility if see any failure.
yes, but the subs usually have to bid it so low that seems like the contractors have a hard time getting them back on site to do maintenance - they only make money on install of new items
No, generally the contractor does the maintenance. It seems the contractor could do the maintenance better since they are out there each day.
N/A
N/A
Yes
No suggestions
Yes
EPSC device installer is typically responsible for maintenance. However, some contractors will maintain certain devices. Pros – installer know how to properly repair/replace. Cons – difficult to meet required timeframe to complete repair when installer maintains devices.
Discussion
Prime contractor is responsible for the maintenance.

Do you have any recommendations to improve or eliminate maintenance activities?
Not really since it will always have to be done to allow devise to work properly
No
Sod get it green as soon as possible. Make it profitable for the Contractor to get project to final stabilization as possible.
Repair and clean as needed
N/A
N/A
No
No
Make it cost effective
Just to encourage contractors to be prompt to do maintenance recommended by the inspector.
N/A
N/A
No

No suggestions.
EPSC devices should be maintained as currently required.
Discussion
Maintenance needs improvement. Separate pay item for maintenance to give incentive. Have prime liable for maintenance.

Are there any devices in which the tabulated quantities do not match the plans?
Rock amounts
No
Rock Rip Rap Quantities Rock checks and Enhanced Rock Checks
YES
n/a
NO
Possibly
Depending on the project sometimes there are conditions that were not caught in the design that we have to add items for.
No
57 stone for construction entrances actually most stone is underestimated
Unknown
Everyone makes mistakes, but I know we try to check this when we do quantities
N/A
I am not aware of any.
No
Not with any consistency
No suggestions
Discussion
Rock quantities.

Do you have any other recommendations to modify the current practices?
Just need more oversight of subs/contractors installing measures
No
None at this time
NO
N/A
NO
No
The design phase field visits should help rectify some of these situations
Yes. Set a conformity for when EPSC items are used. For instance, sediment tubes are to be used for ditches or cut slopes.
No
No
N/A
Not at this time
No
Better supervision of installation of measures.
Comments from the reviewers need to be more consistent with recommendations

No suggestions
Discussion
Additional Site Review should address some design issues.

Are there times when devices are not accurately depicted on the plans?
Yes, a lot of the measures are not shown on the plans correctly but sometimes the plans vs field don't match
Not typically
Sediment filter bags locations to waters of State
Yes
N/A
Yes
Possibly
It's a case by case situation in which something might have been missed or the weather changes the topography
Yes
Unknown
It is hard sometimes because of the scale of the drawings to show devices accurately.
N/A
N/A
Yes, some engineers do not take time to assure quality designs
Yes
Yes. Several EPSC features are incorrectly sized or unclear when using the TDOT CADD standards
Yes.
YES
Discussion
Explore the possibility of correctly locating scaling devices on the plans. Improve QA/QC review for Erosion Plans.

Are there any EPSC devices, which TDOT has a standard drawing for, you never use? If so, please describe.
Catch Basin Filter Assembly (Type 1) because contractors hate making them
Unknown
None at this time rather have the option to use than not to have.
NO
Sediment tube, enhanced silt fence in ditches, rock sediment dam, sediment basin, floating turbidity curtain
NO
Unsure
Not sure
Yes. Sediment Basin
Unknown
Yes, in 28 years of doing this type of work I have never seen enhanced silt fence checks or some of the catch basin options used.
N/A

Perm. Slope Drains, Filter Berms, Enhanced Silt Fence Checks, Sediment Traps, Gabion Check Dams, Level Spreaders, Floating Turbidity Curtain
Yes, but perhaps the need hasn't arisen
I never use the wood and wire fabric “chicken coops” for storm water structure protection. They are just too much trouble and are not feasible under traffic.
No suggestions
Discussion
Recommend removing Enhanced silt fence checks, Gabion Check Dams, Level Spreaders, and catch basin filter assembly (type 1).

Are there times when useful EPSC devices/measures are not included as items on the plans? If so, please describe.
Yes, most general items should always be included in plans quantities even in small amount to allow use
Yes. Sometimes field conditions dictate additional measures not seen during the plan production
Sediment tubes are useful for quick fixes when needed. Usually not included in most plans smaller projects bridge repair projects etc. Very versatile measure need item number and some quantity to implement.
Yes
N/A
No
Unsure
It's a case by case situation in which something might have been missed or the weather changes the topography
No
Slope drains on smaller projects
Unknown
All EPSC items should be available without the hassle of change order, need some type of standardized pricing
Probably because as a designer you try to account for all the contractors needs but sometimes situations come up that require other measures.
N/A
N/A
(Same)
Sediment tubes are sometimes left out. You can't build a job without sediment tubes. Also temporary seeding with mulch and mulch without seeding.
Yes. Construction often request items be added to the plans at field reviews.
Yes, sometimes there is not temporary seed and mulch in the plan quantities
Discussion
Evaluate and recommend listing all devices and item numbers on all roadway plans so a contractor can use an alternative EPSC method without a construction revision or change order.

Do designers properly utilize EPSC devices according to conditions shown on site plans?
50/50, some yes while other plans no not at all
Yes
In most cases. If so can address in Design reviews and Construction Reviews

Most of the time
n/a
Yes
Not necessarily
Typically yes
Yes
Most projects
Unknown
Most of the time
I will speak for our company that we try.
N/A
N/A
Sometimes, no
Most of the time.
Usually.
Usually
No. Silt fence and check dams are not always shown correctly on the plans. Silt fence is shown crossing contours instead of running parallel to the contours and check dams are not spaced properly on the plans, nor is the height of the check dam specified.

Discussion

Usually yes but recommend design specific train need instead of permit compliance such as level I and II.

Are stream diversions being shown on the plans and are they the appropriate type for the field conditions/terrain?

Yes
Not Applicable
Not always unless requested. If addressed on plans eliminates majority of questions from Contractors.
Yes
I have put stream diversions on the plans.
Yes
Unsure
Typically yes
Yes
Unknown
Yes
Mostly, but sometimes what you see on plans as a designer look different in the field and require changes.
N/A
N/A
No experience
In some cases they are impractical to construct in sequence of project construction.
Usually.
Varies, sometimes filed conditions differ
Yes.

Discussion
Yes, they are.

Are sediment traps being shown on plans where needed? How often do you add sediment traps as a revision to your SWPPP in the field?
Yes, and we do add them from time to time on big linear jobs
Not Applicable
Rarely, beginning to see change in plans. Add constantly and as many as possible.
Yes, several times
N/A
Yes/never
Unsure
Not much experience with these
Yes they are being provided where needed. No. We don't use them very often.
Yes, have not
Unknown
They are used but we have made recommendations to add sediment traps where the contractor is constantly cleaning out behind enhanced rock check dams.
N/A
N/A
Not experienced
No comment
No suggestions
Depends on the drainage area,
Additional storage behind check dams is added rather than sediment traps per the standard drawing.
Discussion
Yes, seldom added to SWPPP as needed.

How often do you use sediment basins as shown on TDOT standard drawings?
75% of the time, contractors don't like them due to maintenance requirements
Not Applicable
10-15% Dependent on project size drainage area size and receiving waters.
Very often
N/A
Most of the time
I do not have much experience with sediment basins.
Never if possible.
Unknown
Rarely
Fairly often
N/A
No
Every time one is needed
When absolutely necessary.
No suggestions

Have not used one
Rarely.
Discussion
They are used rarely, but if shown on plans usually it can be installed in accordance to the details.

How much accuracy should be expected of the EPSC plans and quantities without knowledge of a contractor's construction phasing?
Should be 80% accurate, however all contractors are different on when they work and finish an area
This should be reasonably accurate
Limited accuracy, SWPPP is living document for a reason. Contractor varies on how project to be constructed, guesses on how contractor will phase. If environmentally sensitive then TDOT plans and SWPPP should dictate the phasing when needed.
100 accuracy
n/a
85%
The designer is responsible for doing his best, but he does not always have all the information he needs.
Not much
Accurate to the SWPPP consultant's designation
most of the time the items are there to use the change in phasing my change the EPSC plans some but most of the time you can work with it as long as you have the items.
Unknown
Plans are just a depiction to give contractor an option that should work and items needed, can't always guess the sequence of construction
The plans should only be a guide for the contractor. In not knowing his phasing you have to go by a generic phasing plan that you have seen on other projects.
N/A
I would think that it would be reasonably close. Although the contractor may stage things differently, the items would still need to be used at some point in the project.
Accurately enough to make reasonable estimates and allow for unforeseen field conditions
None
The EPSC plans are useless without knowledge of the construction phasing
Accuracy suffers if phasing is not anticipated during design.
It should be an idea of how epsc should be done but needs to have enough quantity in plans to cover the contractors phasing
Designers should be familiar with roadway construction methods in order to prepare a set of plans are accurate and will work if constructed as shown in the plans. It is difficult to determine the method a specific contractor will use to construct the project.
Discussion
Erosion plans should be discussed during the constructability field review in order to improve plans accuracy.

Do you find that construction phasing and grading substantially affects the actual area draining to a device in contrast to the drainage areas on the plans that the EPSC measures were designed for? If so, how do you adjust for that?

Yes, however contractors typically change and argue that the phasing limits his progress and does not typically follow suggested phasing
No
Yes, varies constantly
Yes, we increase erosion measures in that area
N/A
NO
Unsure
Yes, just have to play with it and adjust as you proceed
Grading from the staging is added in by correspondence to the TDOT Drainage Manual
In some cases yes, but if you have items available you can adjust by using combination of required items
Unknown
Depends on the site, it can. Increase the length of the treatment train or try to break up the drainage area and divert flows
It could and if so you have to beef up the measures.
N/A
N/A
Yes, but that is a reasonable scenario. Make sure devices have "safety factors" built in to account for this.
Experience
Yes. Adjustments should be made in the field as grading progresses and the site changes.
Yes, it has to be at the inspector level to recognize that and make field modifications
No.

Discussion

Yes. Often adjustments made to improve erosion control practices in the field.

Do you have any recommendations about how to improve plans accuracy?

Hard for designer to understand site if they never see it vs designing off of topo sheets
No
None at this time. Unless Design wants to become more specific in dictating the Contractor's phasing
Look plans over good at field reviews
N/A
N/A
No
Start doing the field reviews in the field instead of in a Regional Office.
Conform EPSC measures to set quantities and conform all EPSC devices to be used only for certain measurements unless otherwise advised by a SWPPP consultant
Go to the field and visit the site.
Not at this time
Input during field review would help the designer. The TDOT construction office is familiar with what measure works best in their area and could pass along recommendations.

N/A
N/A
No
No comment
No suggestions.
Quantity calculations should be reviewed to reduce and/or limit quantity and cost overruns. It may be necessary to access selected projects to compare the estimated quantities to the actual quantities used during construction.
Discussion
Site review is needed. The new mandatory new site visit step should also identify erosion related issues.

Is there any specific training that you would like have?
No
Certification of installers of BMP EPSC on TDOT projects to include TDOT personnel.
No
Since training is a part of my job now, I guess a class on how to train wouldn't hurt even though Randy and I have had good feedback in our training classes.
Not at this time.
No
Training for EPSC Design and Water Quality Requirements for Environmental Permitting Process
Unknown
It might be helping to have like a question and answer meeting with TDOT and contractors. this way everyone can find out problems the other are having and work toward a solution. I think communication is a big help doing anything.
N/A
N/A
My training level is sufficient
No
TDOT should maintain Level 1 and 2 certifications for all design employees.
Discussion
Mixed feedback. There are already few trainings. Certifying installers should be considered. A new design training is also recommended.

Are there devices that you have used on non-TDOT projects or that you have come up with on your own that you think would be beneficial for TDOT to review?
Would like to see more harvested trees used for mulch, mulch berms are a great EPSC device
No
Variations of slope application of sediment tubes or filter sock that prevents undercutting and riling on steep slopes. Allow a break point in each section on contour that allows water to find way out slowly to next contour. Maintains slope integrity and prevents riling.
No
N/A
N/A
No

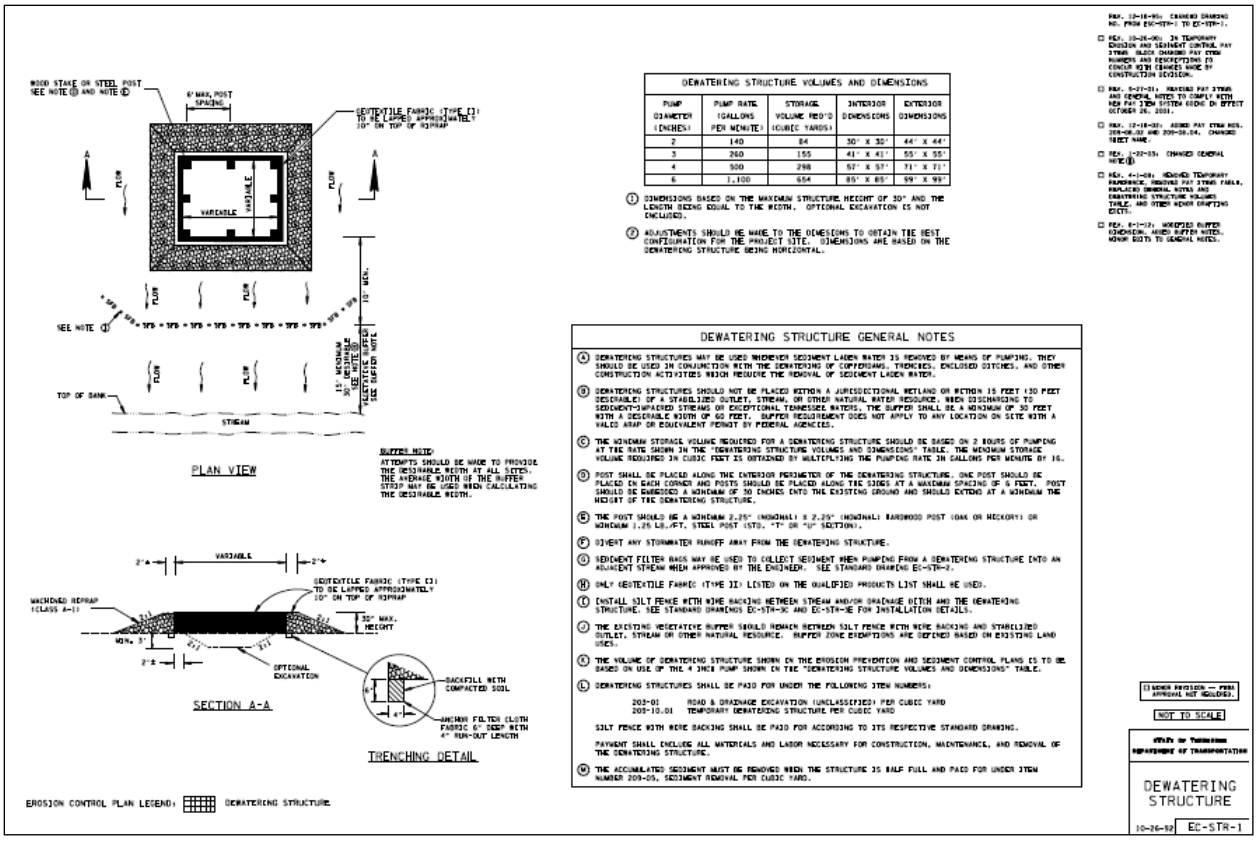
No.
Unknown
I cannot think of any. Most of our work is for TDOT.
I am brand new to EPSC and typically deal with the design portion. Therefore most of this survey did not pertain to myself.
N/A
Pre-fabricated inlet devices
In critical situations, I have used treatment ditches which are created flow way filled with appropriate material to filter out pam treated flow.
No.
PAM or other flocculants shall be looked at a little closer to determine which ones really work. EPSC measures utilized on SR-840 project should be made into standards. An Equivalent Buffers standard should be developed based on equivalent sediment capture. A portable dewatering device – active treatment standard should be developed. The current EPSC standard drawings should be evaluated to see if they are equal to or better the devices in TDEC current manual and for changes in the upcoming construction general permit.

Discussion

Review and adopt 840 devices, consider active treatment systems, limit distance for slope applications. Promote the use of mulch berms often if applicable.

APPENDIX D

CURRENT TDOT EPSC ROADWAY STANDARD DRAWINGS



DEWATERING STRUCTURE VOLUMES AND DIMENSIONS				
PUMP DIAMETER (INCHES)	PUMP RATE (GALLONS PER MINUTE)	STORAGE VOLUME (1) (2) (CUBIC YARDS)	INTERIOR DIMENSIONS	EXTERIOR DIMENSIONS
2	140	84	30' X 30'	44' X 44'
3	260	155	41' X 41'	55' X 55'
4	500	298	57' X 57'	71' X 71'
6	1,100	654	85' X 85'	99' X 99'

(1) DIMENSIONS BASED ON THE MAXIMUM STRUCTURE HEIGHT OF 30" AND THE LENGTH BEING EQUAL TO THE WIDTH. OPTIONAL EXCAVATION IS NOT INCLUDED.

(2) ADJUSTMENTS SHOULD BE MADE TO THE DIMESIONS TO OBTAIN THE BEST CONFIGURATION FOR THE PROJECT SITE. DIMENSIONS ARE BASED ON THE DEWATERING STRUCTURE BEING HORIZONTAL.

DEWATERING STRUCTURE GENERAL NOTES

(A) DEWATERING STRUCTURES MAY BE USED WHENEVER SEDIMENT LADEN WATER IS REMOVED BY MEANS OF PUMPING. THEY SHOULD BE USED IN CONJUNCTION WITH THE DEWATERING OF COFFERDAMS, TRENCHES, ENCLOSED DITCHES, AND OTHER CONSTRUCTION ACTIVITIES WHICH REQUIRE THE REMOVAL OF SEDIMENT LADEN WATER.

(B) DEWATERING STRUCTURES SHOULD NOT BE PLACED WITHIN A JURISDICTIONAL WETLAND OR WITHIN 15 FEET (30 FEET DESIRABLE) OF A STABILIZED OUTLET, STREAM, OR OTHER NATURAL WATER RESOURCE. WHEN DISCHARGING TO SEDIMENT-IMPAIRED STREAMS OR EXCEPTIONAL TENNESSEE WATERS, THE BUFFER SHALL BE A MINIMUM OF 30 FEET WITH A DESIRABLE WIDTH OF 60 FEET. BUFFER REQUIREMENT DOES NOT APPLY TO ANY LOCATION ON SITE WITH A VALID ARAP OR EQUIVALENT PERMIT BY FEDERAL AGENCIES.

(C) THE MINIMUM STORAGE VOLUME REQUIRED FOR A DEWATERING STRUCTURE SHOULD BE BASED ON 2 HOURS OF PUMPING AT THE RATE SHOWN IN THE "DEWATERING STRUCTURE VOLUMES AND DIMENSIONS" TABLE. THE MINIMUM STORAGE VOLUME REQUIRED IN CUBIC FEET IS OBTAINED BY MULTIPLYING THE PUMPING RATE IN GALLONS PER MINUTE BY 16.

(D) POST SHALL BE PLACED ALONG THE INTERIOR PERIMETER OF THE DEWATERING STRUCTURE. ONE POST SHOULD BE PLACED IN EACH CORNER AND POSTS SHOULD BE PLACED ALONG THE SIDES AT A MAXIMUM SPACING OF 6 FEET. POST SHOULD BE EMBEDDED A MINIMUM OF 10 INCHES INTO THE EXISTING GROUND AND SHOULD EXTEND AT A MINIMUM THE HEIGHT OF THE DEWATERING STRUCTURE.

(E) THE POST SHOULD BE A MINIMUM 2.25" (NOMINAL) X 2.25" (NOMINAL) HARDWOOD POST (OAK OR HICKORY) OR MINIMUM 1.25 LB./FT. STEEL POST (ST). "T" OR "U" SECTION).

(F) DIVERT ANY STORMWATER RUNOFF AWAY FROM THE DEWATERING STRUCTURE.

(G) SEDIMENT FILTER BAGS MAY BE USED TO COLLECT SEDIMENT WHEN PUMPING FROM A DEWATERING STRUCTURE INTO AN ADJACENT STREAM WHEN APPROVED BY THE ENGINEER. SEE STANDARD DRAWING EC-STR-2.

(H) ONLY (GEOTEXTILE FABRIC (TYPE II)) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(I) INSTALL SILT FENCE WITH WIRE BACKING BETWEEN STREAM AND/OR DRAINAGE DITCH AND THE (DEWATERING STRUCTURE. SEE STANDARD DRAWINGS EC-STR-3C AND EC-STR-3E FOR INSTALLATION DETAILS.

(J) THE EXISTING VEGETATIVE BUFFER SHOULD REMAIN BETWEEN SILT FENCE WITH WIRE BACKING AND STABILIZED OUTLET, STREAM OR OTHER NATURAL RESOURCE. BUFFER ZONE EXEMPTIONS ARE DEFINED BASED ON EXISTING LAND USES.

(K) THE VOLUME OF DEWATERING STRUCTURE SHOWN ON THE EROSION PREVENTION AND SEDIMENT CONTROL PLANS IS TO BE BASED ON USE OF THE 4 INCH PUMP SHOWN IN THE "DEWATERING STRUCTURE VOLUMES AND DIMENSIONS" TABLE.

(L) DEWATERING STRUCTURES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

203-01	ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED) PER CUBIC YARD
209-10.01	TEMPORARY DEWATERING STRUCTURE PER CUBIC YARD

SILT FENCE WITH WIRE BACKING SHALL BE PAID FOR ACCORDING TO ITS RESPECTIVE STANDARD DRAWING.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE DEWATERING STRUCTURE.

(M) THE ACCUMULATED SEDIMENT MUST BE REMOVED WHEN THE STRUCTURE IS HALF FULL AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

REV. 12-18-95: CHANGED DRAWING NO. FROM EC-STR-1 TO EC-STR-7.

REV. 10-26-00: IN TEMPORARY EROSION AND SEDIMENT CONTROL PAY ITEMS BLOCK CHANGED PAY ITEM NUMBERS AND DESCRIPTIONS TO CONCUR WITH CHANGES MADE BY CONSTRUCTION DIVISION.

REV. 5-27-01: REVISED PAY ITEMS AND REMOVAL NOTES TO COMPLY WITH NEW PAY ITEM SYSTEM CODING IN EFFECT OCTOBER 26, 2001.

REV. 12-18-01: ADDED PAY ITEM NOS. 209-08.02 AND 209-08.04. CHANGED TEXT NOTE.

REV. 1-22-03: CHANGED GENERAL NOTE (I).

REV. 4-1-08: REVISED TEMPORARY REFERENCE, REVISED PAY ITEMS TABLE, REPLACED GENERAL NOTES AND DEWATERING STRUCTURE VOLUMES TABLE, AND OTHER MINOR DRAFTING EDITS.

REV. 6-1-12: MODIFIED BUFFER DIMENSION, ADDED BUFFER NOTES, MINOR EDITS TO GENERAL NOTES.

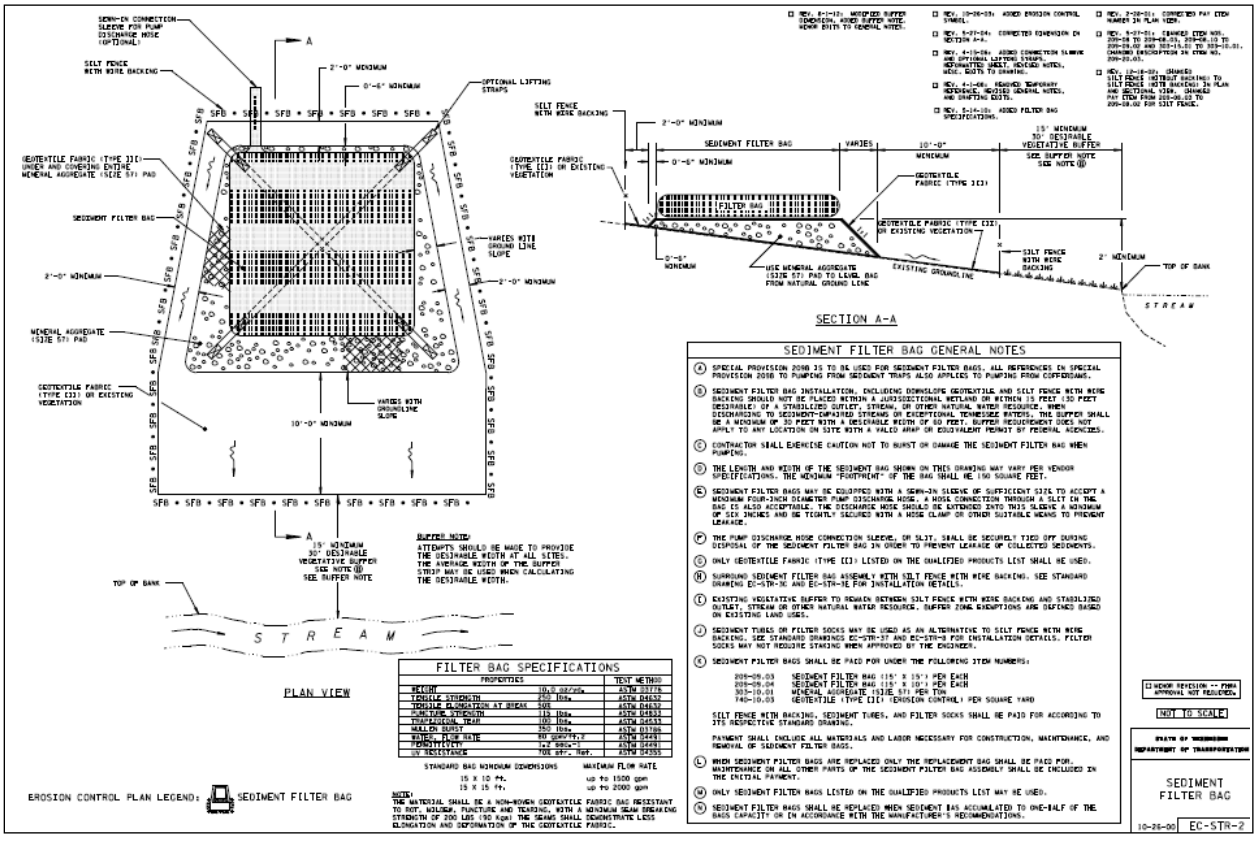
(1) MINOR REVISION — ITEMS APPROVAL NOT REQUIRED.

NOT TO SCALE

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

DEWATERING STRUCTURE

10-26-99 EC-STR-1



FILTER BAG SPECIFICATIONS		
PROPERTIES		TEST METHOD
WEIGHT	10.0 oz/sq. yd.	ASTM D3776
TENSILE STRENGTH	250 lbs.	ASTM D4632
TENSILE ELONGATION AT BREAK	50%	ASTM D4632
PUNCTURE STRENGTH	110 lbs.	ASTM D4833
TRAPEZOIDAL TEAR	100 lbs.	ASTM D4533
MULLEN BURST	350 lbs.	ASTM D3786
WATER FLOW RATE	80 gpm/ft.²	ASTM D4491
PERMITTIVITY	1.2 sec⁻¹	ASTM D4491
UV RESISTANCE	70% str. ret.	ASTM D4355

STANDARD BAG NOMINAL DIMENSIONS	MAXIMUM FLOW RATE
15 X 10 ft.	up to 1500 gpm
15 X 15 ft.	up to 2000 gpm

NOTE: THE MATERIAL SHALL BE A NON-WOVEN GEOTEXTILE FABRIC BAG RESISTANT TO ROT, MILDEW, PUNCTURE AND TEARING, WITH A MINIMUM SEAM BREAKING STRENGTH OF 200 LBS (90 Kgs). THE SEAMS SHALL DEMONSTRATE LESS ELONGATION AND DEFORMATION OF THE GEOTEXTILE FABRIC.

SEDIMENT FILTER BAG GENERAL NOTES

(A) SPECIAL PROVISION 2008 IS TO BE USED FOR SEDIMENT FILTER BAGS. ALL REFERENCES IN SPECIAL PROVISION 2008 TO PUMPING FROM SEDIMENT TRAPS ALSO APPLIES TO PUMPING FROM COFFERDAMS.

(B) SEDIMENT FILTER BAG INSTALLATION, INCLUDING DOWNSLOPE GEOTEXTILE AND SILT FENCE WITH WIRE BACKING SHOULD NOT BE PLACED WITHIN A JURISDICTIONAL WETLAND OR WITHIN 15 FEET (30 FEET DESIRABLE) OF A STABILIZED OUTLET, STREAM, OR OTHER NATURAL WATER RESOURCE. WHEN DISCHARGING TO SEDIMENT-IMPAIRED STREAMS OR EXCEPTIONAL TENNESSEE WATERS, THE BUFFER SHALL BE A MINIMUM OF 30 FEET WITH A DESIRABLE WIDTH OF 60 FEET. BUFFER REQUIREMENT DOES NOT APPLY TO ANY LOCATION ON SITE WITH A VALID ARAP OR EQUIVALENT PERMIT BY FEDERAL AGENCIES.

(C) CONTRACTOR SHALL EXERCISE CAUTION NOT TO BURST OR DAMAGE THE SEDIMENT FILTER BAG WHEN PUMPING.

(D) THE LENGTH AND WIDTH OF THE SEDIMENT BAG SHOWN ON THIS DRAWING MAY VARY PER VENDOR SPECIFICATIONS. THE MINIMUM "FOOTPRINT" OF THE BAG SHALL BE 150 SQUARE FEET.

(E) SEDIMENT FILTER BAGS MAY BE EQUIPPED WITH A SEWN-IN SLEEVE OF SUFFICIENT SIZE TO ACCEPT A MINIMUM FOUR-INCH DIAMETER PUMP DISCHARGE HOSE. A HOSE CONNECTION THROUGH A SLIT IN THE BAG IS ALSO ACCEPTABLE. THE DISCHARGE HOSE SHOULD BE EXTENDED INTO THIS SLEEVE A MINIMUM OF SIX INCHES AND BE TIGHTLY SECURED WITH A HOSE CLAMP OR OTHER SUITABLE MEANS TO PREVENT LEAKAGE.

(F) THE PUMP DISCHARGE HOSE CONNECTION SLEEVE, OR SLIT, SHALL BE SECURELY TIED OFF DURING DISPOSAL OF THE SEDIMENT FILTER BAG IN ORDER TO PREVENT LEAKAGE OF COLLECTED SEDIMENTS.

(G) ONLY (GEOTEXTILE FABRIC (TYPE II)) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(H) SURROUND SEDIMENT FILTER BAG ASSEMBLY WITH SILT FENCE WITH WIRE BACKING. SEE STANDARD DRAWING EC-STR-3C AND EC-STR-3E FOR INSTALLATION DETAILS.

(I) EXISTING VEGETATIVE BUFFER TO REMAIN BETWEEN SILT FENCE WITH WIRE BACKING AND STABILIZED OUTLET, STREAM OR OTHER NATURAL WATER RESOURCE. BUFFER ZONE EXEMPTIONS ARE DEFINED BASED ON EXISTING LAND USES.

(J) SEDIMENT TUBES OR FILTER SOCKS MAY BE USED AS AN ALTERNATIVE TO SILT FENCE WITH WIRE BACKING. SEE STANDARD DRAWINGS EC-STR-3T AND EC-STR-3 FOR INSTALLATION DETAILS. FILTER SOCKS MAY NOT REQUIRE STAKING WHEN APPROVED BY THE ENGINEER.

(K) SEDIMENT FILTER BAGS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-09.03	SEDIMENT FILTER BAG (15' X 15') PER EACH
209-09.04	SEDIMENT FILTER BAG (15' X 10') PER EACH
303-10.01	MINERAL AGGREGATE (53)E 57) PER TON
740-10.03	(GEOTEXTILE (TYPE II)) (EROSION CONTROL) PER SQUARE YARD

SILT FENCE WITH BACKING, SEDIMENT TUBES, AND FILTER SOCKS SHALL BE PAID FOR ACCORDING TO ITS RESPECTIVE STANDARD DRAWING.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF SEDIMENT FILTER BAGS.

(L) WHEN SEDIMENT FILTER BAGS ARE REPLACED ONLY THE REPLACEMENT BAG SHALL BE PAID FOR. MAINTENANCE ON ALL OTHER PARTS OF THE SEDIMENT FILTER BAG ASSEMBLY SHALL BE INCLUDED IN THE INITIAL PAYMENT.

(M) ONLY SEDIMENT FILTER BAGS LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED.

(N) SEDIMENT FILTER BAGS SHALL BE REPLACED WHEN SEDIMENT HAS ACCUMULATED TO ONE-HALF OF THE BAGS CAPACITY OR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

REV. 8-1-12: MODIFIED BUFFER DIMENSION, ADDED BUFFER NOTE, MINOR EDITS TO GENERAL NOTES.

REV. 10-26-05: ADDED EROSION CONTROL SYMBOL.

REV. 5-27-04: CORRECTED DIMENSION IN SECTION A-A.

REV. 4-15-08: ADDED CONNECTION SLEEVE AND OPTIONAL LIFTING STRAPS, REFORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING.

REV. 4-1-08: REVISED TEMPORARY REFERENCE, REVISED GENERAL NOTES, AND DRAFTING EDITS.

REV. 6-1-12: ADDED FILTER BAG SPECIFICATIONS.

REV. 2-26-01: CORRECTED PAY ITEM NUMBER IN PLAN VIEW.

REV. 5-27-01: CHANGED ITEM NOS. 209-08.01 TO 209-08.03, 209-08.10 TO 209-09.02 AND 303-15.01 TO 303-10.01. CHANGED DESCRIPTION IN ITEM NO. 209-03.03.

REV. 12-18-02: CHANGED SILT FENCE (WITHOUT BACKING) TO SILT FENCE (WITH BACKING) IN PLAN AND SECTIONAL VIEW. CHANGED PAY ITEM FROM 209-08.10 TO 209-08.02 FOR SILT FENCE.

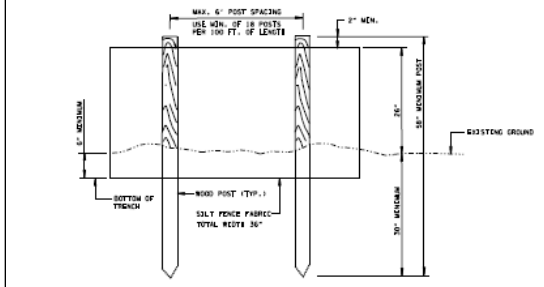
(1) MINOR REVISION — ITEMS APPROVAL NOT REQUIRED.

NOT TO SCALE

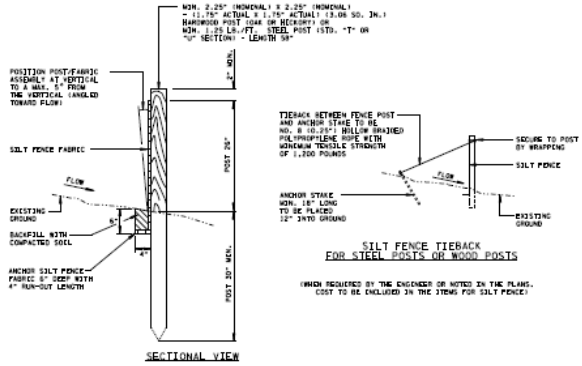
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

SEDIMENT FILTER BAG

10-26-00 EC-STR-2



ELEVATION VIEW



SECTIONAL VIEW

SILT FENCE TIEBACK
FOR STEEL POSTS OR WOOD POSTS

(WHEN REQUIRED BY THE ENGINEER OR NOTED IN THE PLANS. COST TO BE INCLUDED IN THE ITEMS FOR SILT FENCE)

EROSION CONTROL PLAN LEGEND: * SF * SF * SF * SILT FENCE

SILT FENCE FABRIC SPECIFICATIONS

FABRIC PROPERTY AND TEST METHODS	REQUIRED PHYSICAL PROPERTIES (MARV VALUES OF TEST DATA)
GEOTEXTILE FABRIC TYPE	WOVEN SLIT FILM
APPARENT OPENING SIZE (ASTM D4751)	≤ 30 US STD SIEVE
WATER FLUX (ASTM D4491)	≥ 4 GPM/FT²
TENSILE STRENGTH (ASTM D4632)	≥ 120 LB. (WARP DIRECTION) X 100 LB. (FILL DIRECTION)
ULTRAVIOLET STABILITY (AFTER 500 HRS PER ASTM D4355)	≥ 70%
ELONGATION (ASTM D4632)	≤ 20% (MAX)
BURST STRENGTH (ASTM D3786)	≥ 250 PSI
PUNCTURE STRENGTH (ASTM D4833)	≥ 60 LB.
TRAPEZOIDAL TEAR (ASTM D4533)	≥ 50 LB. (WARP DIRECTION) X 40 LB. (FILL DIRECTION)

SILT FENCE GENERAL NOTES

(A) SILT FENCE IS USED TO INTERCEPT SMALL AMOUNTS OF SEDIMENT AND REDUCE VELOCITY FROM SHEET FLOW ONLY. DO NOT USE IT ADJACENT TO NATURAL WATER RESOURCES (WETLANDS OR STREAMS) OR ACROSS CONCENTRATED FLOW PATHS.

(B) THE MAXIMUM DRAINAGE AREA SIZE FOR A CONTINUOUS BARRIER SHALL BE ½ ACRE PER 100 LINEAR FEET OF FENCE LENGTH UP TO A MAXIMUM DRAINAGE AREA OF 2 ACRES. MAXIMUM SLOPE LENGTH BEHIND FENCE ON UPSLOPE SIDE SHALL BE 110 FEET (AS MEASURED ALONG THE GROUND SURFACE).

(C) WHEN INSTALLED AT THE TOE OF A SLOPE, SILT FENCE SHOULD BE PLACED 5 FEET TO 7 FEET AWAY FROM THE TOE TO ALLOW SPACE FOR PONDING OF WATER, COLLECTION OF SEDIMENT, AND EASE OF MAINTENANCE AND REMOVAL.

(D) WHEN TWO SECTIONS OF SILT FENCE FABRIC ADJOIN EACH OTHER THEY SHALL BE JOINED ACCORDING TO THE DETAILS ON STANDARD DRAWING EC-STR-3E.

(E) MAINTENANCE SHALL BE PERFORMED AS NEEDED; CAPTURED SOIL MATERIAL SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE AND/OR OTHER EVIDENCE OF FILTER CLOGGING IS OBSERVED.

(F) STEEL POSTS SHALL BE ROLLED FROM HIGH CARBON STEEL AND SHALL HAVE A MINIMUM WEIGHT OF 1.25 LB/FT. POSTS SHALL BE HOT-DIPPED GALVANIZED OR PAINTED WITH HIGH GRADE WEATHER RESISTANT STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH AN ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR PUNCHED TO AID IN THE ATTACHMENT OF THE WIRE BACKING. POSTS AND ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.

(G) WHEN STEEL POSTS ARE USED THEY SHALL HAVE A PROJECTION FOR FASTENING WIRE TO THEM. THE WIRE FASTENERS SHALL BE EVENLY SPACED WITH AT LEAST FIVE PER POST.

(H) IF THE FILTER MATERIAL IS STAPLED TO THE WOODEN STAKES, HEAVY DUTY WIRE STAPLES WITH ONE-HALF INCH LENGTH AND 1 INCH WIDTH SHALL BE USED AND EVENLY SPACED WITH AT LEAST FOUR PER POST. SILT FENCE FABRIC SHALL NOT BE STAPLED TO TREES.

(I) SILT FENCES SHOULD BE PLACED ALONG OR NEAR THE GROUND CONTOUR. THE BOTTOM OF FENCE AT GROUNDLINE SHOULD BE ON A ZERO PERCENT (0%) GRADE, PLUS OR MINUS FIVE TENTHS OF ONE PERCENT (±0.5%). THE ENDS OF A RUN OF SILT FENCE SHOULD BE TURNED UPSLOPE FORMING A J-HOOK TO FILTER ANY CONCENTRATED FLOW BEHIND FENCE.

(J) A PREASSEMBLED SILT FENCE MEETING THE REQUIREMENTS OF THIS DRAWING IS ACCEPTABLE IN LIEU OF A FIELD CONSTRUCTED SILT FENCE.

(K) STATIC SLICING IS THE PREFERRED METHOD OF FENCE INSTALLATION. STATIC SLICING INVOLVES THE INSERTION OF A NARROW CUTTING BLADE, PLACED AT THE SPECIFIED ANCHOR DEPTH FOR THE GIVEN FABRIC AS SHOWN ON THE APPLICABLE DETAIL, AND (SIMULTANEOUSLY PULLING THE FENCE FABRIC INTO THE TRENCH AS THE TRENCH IS BEING EXCAVATED. ALTERNATE TRENCH-BASED METHODS ARE ALSO ACCEPTABLE. FOR TRENCH-BASED INSTALLATIONS, SILT FENCING SHALL BE INSTALLED PER THE FOLLOWING STEPS AND IN THE FOLLOWING ORDER:

- EXCAVATE TRENCH A MAXIMUM OF 4 INCHES WIDE AND 6 INCHES DEEP. THE TRENCH SHALL BE HAND-CLEANED FOLLOWING EXCAVATION TO REMOVE BULKY DEBRIS SUCH AS ROCKS, STICKS, AND SOIL CLODS FROM THE TRENCH.
- INSTALL FABRIC IN TRENCH.
- BACKFILL TRENCH (OVER-FILL) WITH SOIL PLACED AROUND FABRIC.
- COMPACT SOIL BACKFILL WITH MECHANICAL EQUIPMENT. DO NOT DAMAGE THE FABRIC DURING COMPACTION (DAMAGED FABRIC SHALL BE REPLACED).
- DRIVE AND SET SUPPORT POSTS PER SPACING REQUIREMENTS GIVEN ON THE APPLICEABLE FENCE DETAIL. FOR PRE-ASSEMBLED SILT FENCE, DRIVE SUPPORT IN TO GROUND FIRST, FOLLOWED BY FABRIC PLACEMENT IN TRENCH.
- ATTACH FABRIC TO THE POSTS USING WIRE TIES OR STAPLES. SPACING AND DENSITY OF TIES OR STAPLES SHALL BE INSTALLED AS DESCRIBED IN NOTES F AND G.

(L) ONLY SILT FENCE FABRIC LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED. ANY PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE MAY ALSO BE USED.

(M) SILT FENCE SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-08.03 TEMPORARY SILT FENCE (WITHOUT BACKING) PER LINEAR FOOT

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE SILT FENCE.

(N) SEDIMENT SHALL BE REMOVED FROM BEHIND THE SILT FENCE WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

REV. 12-18-03: MODIFIED TABLE (A) AND GENERAL NOTE (K).

REV. 7-09-04: CHANGED VALUES IN TABLE 1 FROM MEAN TO MARV VALUES.

REV. 4-15-06: MODIFIED FABRIC PROPERTY AND TEST METHODS TABLE, REVISED TITLE TO INCLUDE "SPECIFICATIONS", REVISED GENERAL NOTES, REFORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING.

REV. 4-1-08: REVISED TEMPORARY REFERENCES, REVISED NOTES, AND MISC. EDITS TO DRAWING.

REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.

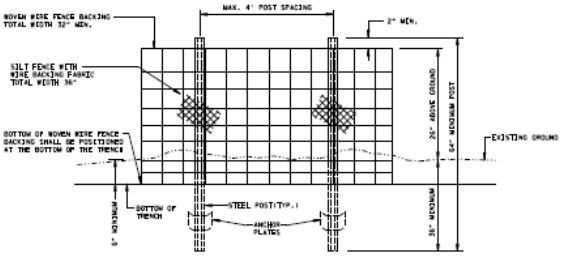
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

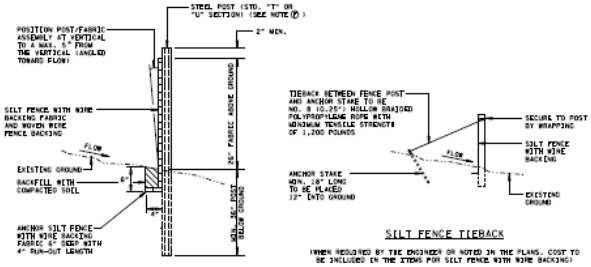
STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

SILT FENCE

12-18-02 EC-STR-3B



ELEVATION VIEW



SECTIONAL VIEW

SILT FENCE TIEBACK

(WHEN REQUIRED BY THE ENGINEER OR NOTED IN THE PLANS. COST TO BE INCLUDED IN THE ITEMS FOR SILT FENCE WITH WIRE BACKING)

EROSION CONTROL PLAN LEGEND: * SFB * SFB * SFB * SILT FENCE WITH WIRE BACKING

SILT FENCE WITH WIRE BACKING FABRIC SPECIFICATIONS

FABRIC PROPERTY AND TEST METHODS	REQUIRED PHYSICAL PROPERTIES (MARV VALUES OF TEST DATA)
GEOTEXTILE FABRIC TYPE	WOVEN MONOFILAMENT
APPARENT OPENING SIZE (ASTM D4751)	≤ 10 TO 100 US STANDARD SIEVE
WATER FLUX (ASTM D4491)	≥ 18 GPM/FT²
TENSILE STRENGTH (ASTM D4632)	≥ 310 LB. (WARP DIRECTION) X 200 LB. (FILL DIRECTION)
ULTRAVIOLET STABILITY (AFTER 500 HRS PER ASTM D4355)	≥ 90%
BURST STRENGTH (ASTM D3786)	≥ 400 PSI
PUNCTURE STRENGTH (ASTM D4833)	≥ 105 LB.
TRAPEZOIDAL TEAR (ASTM D4533)	≥ 100 LB. (WARP DIRECTION) X 80 LB. (FILL DIRECTION)

SILT FENCE WITH WIRE BACKING GENERAL NOTES

(A) SILT FENCE WITH WIRE BACKING IS USED TO INTERCEPT SMALL AMOUNTS OF SEDIMENT AND REDUCE VELOCITY FROM SHEET FLOW ONLY. USE SILT FENCE WITH WIRE BACKING UP-GRADIENT TO, AND ALONG THE PERIMETER OF STREAMS, WETLANDS, PONDS, SPRINGS, OR OTHER NATURAL WATER RESOURCES LOCATED WITHIN OR ADJACENT TO THE PROJECT RIGHT-OF-WAY AND AT LARGE FILL SLOPES.

(B) THE MAXIMUM DRAINAGE AREA SIZE FOR CONTINUOUS SILT FENCE WITH BACKING SHALL BE 1 ACRE PER 150 LINEAR FEET OF FENCE LENGTH. MAXIMUM SLOPE LENGTH BEHIND FENCE ON UPSLOPE SIDE SHALL BE 290 FEET (AS MEASURED ALONG THE GROUND SURFACE).

(C) WHEN INSTALLED AT THE TOE OF A SLOPE SILT FENCE WITH WIRE BACKING SHOULD BE PLACED 5 FEET TO 10 FEET AWAY FROM THE TOE TO ALLOW SPACE FOR PONDING OF WATER, COLLECTION OF SEDIMENT, AND EASE OF MAINTENANCE AND REMOVAL.

(D) WHEN TWO SECTIONS OF SILT FENCE WITH WIRE BACKING FABRIC ADJOIN EACH OTHER, THEY SHALL BE JOINED ACCORDING TO THE DETAILS ON STANDARD DRAWING EC-STR-3E.

(E) MAINTENANCE SHALL BE PERFORMED AS NEEDED; CAPTURED SOIL MATERIAL SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE AND/OR WHEN EVIDENCE OF FILTER CLOGGING IS OBSERVED.

(F) STEEL POSTS SHALL BE ROLLED FROM HIGH CARBON STEEL AND SHALL HAVE A MINIMUM WEIGHT OF 1.25 LB/FT. POSTS SHALL BE HOT-DIPPED GALVANIZED OR PAINTED WITH HIGH GRADE WEATHER RESISTANT STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH AN ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR PUNCHED TO AID IN THE ATTACHMENT OF THE WIRE BACKING. POSTS AND ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.

(G) STEEL POSTS SHALL HAVE A PROJECTION FOR FASTENING WIRE TO THEM. WOVEN WIRE FENCE BACKING TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES. THE WIRE FASTENERS SHOULD BE EVENLY SPACED WITH AT LEAST SIX PER POST.

(H) FABRIC SHALL BE FASTENED SECURELY TO WOVEN WIRE FENCE BACKING WITH THE TIES SPACED EVERY 24 INCHES ALONG TOP AND MIDSECTION.

(I) WOVEN WIRE FENCE BACKING SHALL MEET THE REQUIREMENTS FOR ASTM A-116 FOR NO. 11 FARM, DESIGN NO. 832-6-11, CLASS 3 COATING.

(J) SILT FENCE WITH BACKING SHOULD BE PLACED ALONG OR NEAR THE GROUND CONTOUR. THE BOTTOM OF FENCE AT GROUNDLINE SHOULD BE ON A ZERO PERCENT (0%) GRADE, PLUS OR MINUS FIVE TENTHS OF ONE PERCENT (±0.5%). THE END OF A RUN OF SILT FENCE WITH WIRE BACKING SHOULD BE TURNED UP SLOPE FORMING A J-HOOK TO FILTER ANY CONCENTRATED FLOW BEHIND FENCE.

(K) FOR TRENCH-BASED INSTALLATIONS, SILT FENCING WITH WIRE BACKING SHALL BE INSTALLED PER THE FOLLOWING STEPS AND IN THE FOLLOWING ORDER:

- EXCAVATE TRENCH A MAXIMUM OF 4 INCHES WIDE AND 6 INCHES DEEP. THE TRENCH SHALL BE HAND-CLEANED FOLLOWING EXCAVATION TO REMOVE BULKY DEBRIS SUCH AS ROCKS, STICKS, AND SOIL CLODS FROM THE TRENCH.
- DRIVE AND SET SUPPORT POSTS PER SPACING REQUIREMENTS GIVEN ON THE APPLICEABLE FENCE DETAIL.
- ATTACH WOVEN WIRE FENCE BACKING TO POSTS AND FABRIC TO THE WIRE BACKING USING WIRE TIES. SPACING AND DENSITY OF TIES SHALL BE INSTALLED ACCORDING TO NOTES G AND H.
- INSTALL FABRIC IN TRENCH.
- BACKFILL TRENCH (OVER-FILL) WITH SOIL PLACED AROUND FABRIC.
- COMPACT SOIL BACKFILL WITH MECHANICAL EQUIPMENT. DO NOT DAMAGE THE FABRIC DURING COMPACTION (DAMAGED FABRIC SHALL BE REPLACED).

(L) ONLY SILT FENCE WITH WIRE BACKING FABRIC LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED. ANY PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE MAY ALSO BE USED.

(M) SILT FENCE WITH WIRE BACKING SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-08.02 TEMPORARY SILT FENCE (WITH BACKING) PER LINEAR FOOT

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE SILT FENCE WITH WIRE BACKING.

(N) SEDIMENT SHALL BE REMOVED FROM BEHIND THE SILT FENCE WITH WIRE BACKING WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

REV. 12-18-03: MODIFIED TABLE (B) AND GENERAL NOTE (K).

REV. 7-09-04: CHANGED VALUES IN TABLE 2 FROM MEAN TO MARV VALUES.

REV. 4-15-06: MODIFIED FABRIC PROPERTY AND TEST METHODS TABLE, REVISED TITLE TO INCLUDE "SPECIFICATIONS", REVISED GENERAL NOTES, REFORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING.

REV. 4-1-08: REVISED TEMPORARY REFERENCES, REVISED NOTES, AND MISC. EDITS TO DRAWING.

REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.

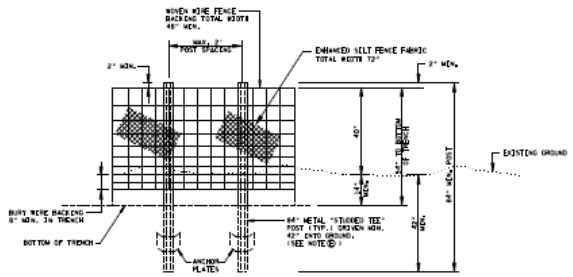
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

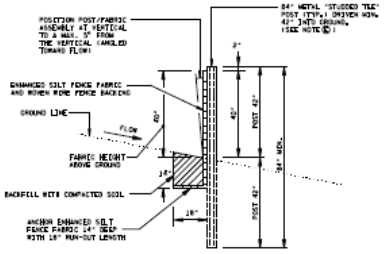
STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

SILT FENCE WITH WIRE BACKING

12-18-02 EC-STR-3C



ELEVATION VIEW



SECTIONAL VIEW

EROSION CONTROL PLAN LEGEND: ✦ ESF ✦ ESF ✦ ESF ✦ ENHANCED SILT FENCE

ENHANCED SILT FENCE FABRIC SPECIFICATIONS	
FABRIC PROPERTY AND TEST METHODS	REQUIRED PHYSICAL PROPERTIES (MARV VALUES OF TEST DATA)
GEOTEXTILE FABRIC TYPE APPARENT OPENING SIZE (ASTM D4751)	WOVEN MONOFILAMENT ≤ 30 TO ≥ 40 STANDARD SIEVE
WATER FLUX (ASTM D4491) TENSILE STRENGTH (ASTM D4632)	≥ 110 GPM/FT² ≥ 370 LBS. (WARP DIRECTION) X ≥ 290 LBS. (FILL DIRECTION)
ULTRAVIOLET STABILITY (AFTER 500 HRS PER ASTM D4355)	≥ 90%
BURST STRENGTH (ASTM D3786) PUNCTURE STRENGTH (ASTM D4833) TRAPEZOIDAL TEAR (ASTM D4533)	≥ 470 PSI ≥ 110 LB. ≥ 115 LB. (WARP DIRECTION) X ≥ 75 LB. (FILL DIRECTION)
PERMEABILITY (ASTM D4491) THICKNESS (ASTM D5199)	≥ 0.02 INCHES/SEC ≤ 35 MILS

ENHANCED SILT FENCE GENERAL NOTES

A. ENHANCED SILT FENCE IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. SWALES, DITCHES, RUTS ALONG SLOPES) ARE ANTICIPATED. LENGTH OF FLOW APPLICATIONS FOR USE OF ENHANCED SILT FENCE ARE GIVEN ON STANDARD DRAWINGS EC-STR-4 AND EC-STR-4A. DO NOT USE ENHANCED SILT FENCE IN OR ADJACENT TO NATURAL WATER RESOURCES (WETLANDS OR STREAMS).

B. ENHANCED SILT FENCE SHOULD NOT BE USED TO REPLACE SILT FENCE WITH WIRE BACKING.

C. WHEN TWO SECTIONS OF ENHANCED SILT FENCE FABRIC ADJOIN EACH OTHER THEY SHALL BE JOINED ACCORDING TO THE DETAILS ON STANDARD DRAWING EC-STR-3E.

D. MAINTENANCE SHALL BE PERFORMED AS NEEDED. CAPTURED SOIL MATERIAL SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE AND/OR WHEN EVIDENCE OF FILTER CLOGGING IS NOTED.

E. STEEL POSTS SHALL BE ROLLED FROM HIGH CARBON STEEL AND SHALL HAVE A MINIMUM WEIGHT OF 1.25 LB/FT. POSTS SHALL BE HOT-DIPPED GALVANIZED OR PAINTED WITH HIGH GRADE WEATHER RESISTANT STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH AN ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR PUNCHED TO AID IN THE ATTACHMENT OF THE WIRE BACKING. POSTS AND ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.

F. STEEL POSTS SHALL HAVE A PROJECTION FOR FASTENING WIRE TO THEM. WOVEN WIRE FENCE BACKING TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES. TIE WIRE FASTENERS SHOULD BE EVENLY SPACED WITH AT LEAST SIX PER POST.

G. WOVEN WIRE FENCE BACKING SHALL MEET THE REQUIREMENTS FOR ASTM A-116 FOR NO. 12 FARM, DESIGN NO. 1047-6-12, CLASS 3 COATING.

H. FILTER FABRIC SHALL BE FASTENED SECURELY TO WOVEN WIRE FENCE BACKING WITH TIES SPACED EVERY 24 INCHES ALONG TOP AND MID SECTION.

I. FOR TRENCH-BASED INSTALLATIONS, ENHANCED SILT FENCING SHALL BE INSTALLED PER THE FOLLOWING STEPS AND IN THE FOLLOWING ORDER:

- EXCAVATE TRENCH A MAXIMUM OF 18 INCHES WIDE 14 INCHES DEEP. THE TRENCH SHALL BE HAND-CLEANED FOLLOWING EXCAVATION TO REMOVE BULKY DEBRIS SUCH AS ROCKS, STICKS, AND SOIL CLODS FROM THE TRENCH.
- DRIVE AND SET SUPPORT POSTS PER SPACING REQUIREMENTS GIVEN ON THE APPLICABLE FENCE DETAIL.
- ATTACH WOVEN WIRE FENCE BACKING TO POSTS AND FABRIC TO THE WIRE BACKING USING WIRE TIES. SPACING AND DENSITY OF TIES SHALL BE INSTALLED ACCORDING TO NOTES F AND H.
- INSTALL FABRIC IN TRENCH.
- BACKFILL TRENCH (OVER-FILL) WITH SOIL PLACED AROUND FABRIC.
- COMPACT SOIL BACKFILL WITH MECHANICAL EQUIPMENT. DO NOT DAMAGE THE FABRIC DURING COMPACTION (DAMAGED FABRIC SHALL BE REPLACED).

J. ONLY ENHANCED SILT FENCE FABRIC LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED. ANY PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE MAY ALSO BE USED.

K. ENHANCED SILT FENCE SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-08.04 TEMPORARY ENHANCED SILT FENCE PER LINEAR FOOT

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE ENHANCED SILT FENCE.

L. SEDIMENT SHALL BE REMOVED FROM BEHIND THE ENHANCED SILT FENCE WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

- REV. 12-18-09: REPLACED TABLE (J) AND MODIFIED GENERAL NOTES (B), (D), AND (I).
- REV. 7-29-04: CHANGED VALUES IN TABLE 1 FROM MEAN TO MARV VALUES.
- REV. 4-15-04: MODIFIED NOTE (B), ADDED NOTE (I), RE-TITLED TABLE TITLE, REFORMATTED GENERAL NOTES, RE-FORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING.
- REV. 4-1-09: REMOVED TEMPORARY REFERENCE, REVISED GENERAL NOTES, AND MISC. EDITS TO DRAWING.

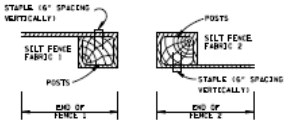
MINOR REVISION — FHWA APPROVAL NOT REQUIRED.

STATE OF VERMONT AGENCY OF TRANSPORTATION

ENHANCED SILT FENCE

12-18-02 EC-STR-3D

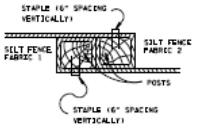
STEP 1



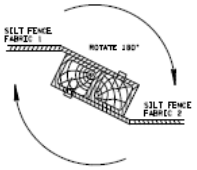
① WRAP FABRIC AROUND END SUPPORTS AS SHOWN AND ANCHOR FABRIC TO POSTS.

② POSITION POSTS/FABRIC AS SHOWN ABOVE.

STEP 2



STEP 3

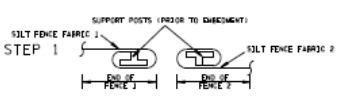


① ROTATE BOTH POSTS WITH FABRIC CLOCKWISE AT LEAST 180°.

② EMBED BOTH POSTS INTO GROUND PER SILT FENCE STANDARD DRAWING EC-STR-3E.

PLAN VIEW
JOINING SILT FENCE
FABRIC SECTIONS (WOOD POSTS)

STEP 1



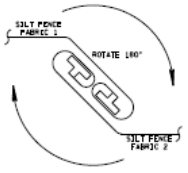
① WRAP FABRIC AROUND END SUPPORTS AS SHOWN AND ANCHOR FABRIC TO POSTS.

② POSITION POSTS/FABRIC AS SHOWN ABOVE.

STEP 2

① POSITION THE SILT FENCE FABRIC 2 POST INSIDE OF THE SILT FENCE FABRIC 1 POST AS SHOWN ABOVE.

STEP 3



① ROTATE BOTH POSTS WITH FABRIC CLOCKWISE AT LEAST 180°.

② EMBED BOTH POSTS INTO GROUND PER APPLICABLE SILT FENCE STANDARD DRAWING. (EC-STR-3B, EC-STR-3C, OR EC-STR-3D)

PLAN VIEW
JOINING SILT FENCE
FABRIC SECTIONS (STEEL POSTS)

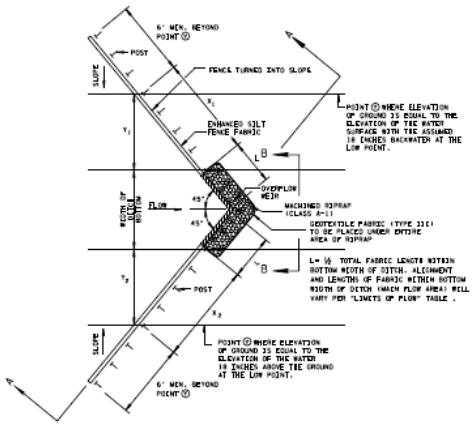
- REV. 4-15-04: REFORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING.
- REV. 4-1-09: MISC. EDITS TO DRAWING, CHANGED DRAWING NAME, REFORMATTED SHEET.

MINOR REVISION — FHWA APPROVAL NOT REQUIRED.

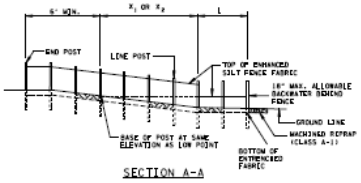
STATE OF VERMONT AGENCY OF TRANSPORTATION

SILT FENCE FABRIC JOINING DETAILS

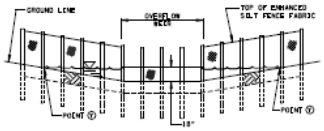
12-18-02 EC-STR-3E



PLAN VIEW



SECTION A-A



ELEVATION VIEW B-B

- REV. 12-18-07: MODIFIED SPACING FOR ENHANCED SILT FENCE DETAIL AND ADDED SUPPORTING TABLE, MODIFIED TABLE 4 AND GENERAL NOTES.
- REV. 3-15-04: CHANGED PLANS LEGEND SYMBOL.
- REV. 4-15-08: ADDED OVERFLOW WEIR, SECTION B-B, REVISED TABLE TITLE, NOTE#4(TITLE) SAFETY, REVISED NOTES, MISC. EDITS TO DRAWING, CHANGED FLAN SYMBOL, CHANGED DRAWING NAME.
- REV. 4-1-08: REMOVED TEMPORARY REFERENCE, MISC. EDITS TO DRAWING, CHANGED DRAWING NAME, REVISED GENERAL NOTES.
- REV. 1-1-10: MINOR SPACING DETAILS TO EC-STR-4B. REVISED GENERAL NOTES.
- REV. 8-1-12: REVISED GENERAL NOTES.

LIMITS OF FLOW

WIDTH OF DITCH BOTTOM (FT) (SEE NOTE ⓔ)	② TOTAL ENHANCED SILT FENCE CHECK LENGTH 2L (LENGTH L) WITHIN FLAT-BOTTOM ZONE OF DITCH, (FT)	X_1 OR X_2 (FT)			TOTAL AVAILABLE SURFACE AREA OF FABRIC IN DITCH AT 18 INCHES OF FLOW DEPTH (FT^2)			① MAXIMUM ALLOWABLE PEAK FLOW (CFS)		
		2:1	3:1	4:1	2:1 SIDESLOPE	3:1 SIDESLOPE	4:1 SIDESLOPE	2:1 SIDESLOPE	3:1 SIDESLOPE	4:1 SIDESLOPE
3	4.2 (2.1)	4.2	5.4	8.5	12.6	15.8	19.0	4.6	5.5	6.4
4	5.7 (2.9)	4.2	5.4	8.5	14.9	18.0	21.2	5.6	6.5	7.4
5	7.0 (3.5)	4.2	5.4	8.5	16.8	20.0	23.2	6.4	7.3	8.3
6	8.5 (4.3)	4.2	5.4	8.5	19.1	22.2	25.4	7.4	8.3	9.2
7	9.9 (5.0)	4.2	5.4	8.5	21.2	24.3	27.5	8.3	9.2	10.1
8	11.3 (5.7)	4.2	5.4	8.5	23.3	26.4	29.6	9.2	10.1	11.1
9	12.7 (6.4)	4.2	5.4	8.5	25.4	28.5	31.7	10.1	11.0	12.0
10	14.1 (7.1)	4.2	5.4	8.5	27.5	30.6	33.8	11.0	12.0	12.9
12	17.0 (8.5)	4.2	5.4	8.5	31.8	35.0	38.2	12.9	13.8	14.8
15	21.2 (10.6)	4.2	5.4	8.5	38.1	41.3	44.5	15.7	16.6	17.5

① BASED ON 110 GPM/FT^2 (0.02 INCHES/SEC PERMEABILITY) ENHANCED SILT FENCE DITCH CHECK FABRIC AND TRAPEZOIDAL DITCH CROSS SECTION. SEE STANDARD DRAWING EC-STR-3D FOR FABRIC SPECIFICATIONS. A HEAD OF 18 INCHES BEHIND THE FENCE WAS USED TO DETERMINE MAXIMUM ALLOWABLE DESIGN PEAK FLOW THROUGH THE FILTER FABRIC. ALLOWABLE FLOWS DO NOT INCLUDE HYDRAULIC REDUCTION DUE TO ACCUMULATION OF CAPTURED SOIL PARTICLES ON THE FABRIC SURFACE AREA.

② THIS LENGTH IS TO BE ADDED TO CALCULATED LENGTHS X_1 AND X_2. LENGTH Y_1 AND Y_2 ARE BASED ON PERPENDICULAR SLOPE LENGTHS TO A POINT WHERE THE BASE OF POST ENTERING THE GROUND IS AT THE SAME ELEVATION AS A POINT 18 INCHES ABOVE THE GROUND AT THE LOW POINT OF THE DITCH. LENGTHS X_1 AND X_2 ARE CALCULATED BY MULTIPLYING THE LENGTHS OF SLOPE Y_1 OR Y_2 AT EACH INDIVIDUAL LOCATION BY 1.414.

EROSION CONTROL PLAN LEGEND: > ENHANCED SILT FENCE CHECK (TRAPEZOIDAL DITCH)

ENHANCED SILT FENCE CHECK GENERAL NOTES

Ⓐ ENHANCED SILT FENCE CHECKS ARE USED TO REMOVE SUSPENDED SEDIMENTS FROM STORM WATER FLOW VIA SETTLING AND FILTRATION. THEY ARE ALSO USED FOR VELOCITY REDUCTION. ENHANCED SILT FENCE CHECKS SHOULD NOT BE PLACED IN STREAMS OR OTHER NATURAL WATER RESOURCES.

Ⓑ A DITCH WITH A TRAPEZOIDAL CROSS-SECTION IS ASSUMED WITH SIDE SLOPES AS NOTED.

Ⓒ CHECK LENGTH DESIGNATED IN THE "LIMITS OF FLOW" TABLE ONLY INCLUDES THE LENGTH OF FENCE STAKED WITHIN THE BOTTOM WIDTH OF DITCH (2L).

Ⓓ SELECT A DITCH BOTTOM WIDTH FROM THE "LIMITS OF FLOW" TABLE SUCH THAT THE MAXIMUM ALLOWABLE DESIGN PEAK FLOW OBTAINED FROM THE APPROPRIATE COLUMN AT THE RIGHT SIDE OF THE TABLE IS EQUAL TO OR GREATER THAN THE 2-YEAR, 24-HOUR FLOW RATE AT THE CHECK. IF THE SITE DRAINS TO A SEDIMENT-IMPAIRED STREAM OR EXCEPTIONAL TENNESSEE WATERS, THE FLOW OBTAINED FROM THE TABLE MUST BE EQUAL TO OR GREATER THAN THE 5-YEAR, 24-HOUR FLOW RATE. FLOWS IN EXCESS OF THESE VALUES MAY BE PASSED OVER THE WEIR.

Ⓔ IT MAY BE NECESSARY TO FLATTEN THE DITCH SIDE SLOPES AND/OR WIDEN THE DITCH BOTTOM WIDTH IN THE VICINITY OF THE CHECK IN ORDER TO ACHIEVE THE SURFACE AREA OF FABRIC REQUIRED FOR THE CHECK. REFER TO EC-STR-4B.

Ⓕ THE SPACING OF ENHANCED SILT FENCE CHECKS ALONG A DITCH SHOULD BE BASED ON A COMBINATION OF HYDRAULIC PROPERTIES OF THE FENCE MATERIAL, LENGTH OF FLOW TABLE, AND THE SPACING TABLE (EC-STR-4B).

Ⓖ THE FLOW VALUES IN THE LENGTH OF FLOW TABLE ASSUME NO CLOGGING OF THE ENHANCED SILT FENCE CHECK FABRIC SURFACE. IN ORDER TO INSURE MINIMAL INFLUENCE FROM CLOGGING, ENHANCED SILT FENCE CHECKS SHOULD BE REGULARLY CLEANED BY DRY BRUSHING AND/OR PRESSURE WASHING THE FABRIC SURFACE.

Ⓗ FOR INSTALLATION DETAILS FOR ENHANCED SILT FENCE SEE STANDARD DRAWINGS EC-STR-3D AND EC-STR-3E.

Ⓘ UPON REMOVAL OF THE ENHANCED SILT FENCE CHECK THE AREA BENEATH THE ENHANCED SILT FENCE CHECK LOCATION SHOULD BE IMMEDIATELY COVERED WITH SEEDING AND EROSION CONTROL BLANKETS OR TURF REINFORCEMENT MATS OR IT SHOULD BE SODDED.

Ⓙ ANY PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE MAY ALSO BE USED.

Ⓚ ENHANCED SILT FENCE CHECKS SHOULD BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-08.06 ENHANCED SILT FENCE CHECK (TRAPEZOIDAL) PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE ENHANCED SILT FENCE CHECK.

Ⓛ SEDIMENT SHALL BE REMOVED FROM BEHIND THE ENHANCED SILT FENCE CHECK WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT TO THE STRUCTURE AND PAID FOR UNDER ITEM NO. 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

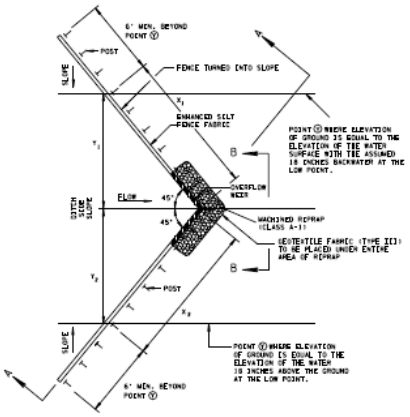
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

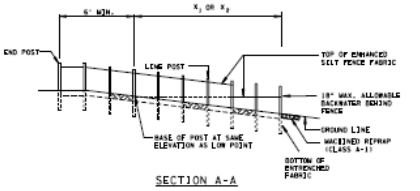
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

ENHANCED SILT FENCE CHECK (TRAPEZOIDAL DITCH)

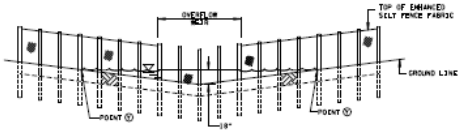
12-28-02 EC-STR-4



PLAN VIEW



SECTION A-A



ELEVATION VIEW B-B

- REV. 12-18-07: MODIFIED SPACING FOR ENHANCED SILT FENCE DETAIL AND ADDED SUPPORTING TABLE, MODIFIED TABLE 5 AND GENERAL NOTES.
- REV. 3-15-04: CHANGED PLANS LEGEND SYMBOL.
- REV. 4-15-08: ADDED OVERFLOW WEIR AND SECTION B-B, REVISED TABLE TITLE, NOTE#4(TITLE) SAFETY, REVISED NOTES, MISC. EDITS TO DRAWING, CHANGED DRAWING NAME.
- REV. 4-1-08: REMOVED TEMPORARY REFERENCE, MISC. EDITS TO DRAWING, CHANGED DRAWING NAME, REVISED GENERAL NOTES.
- REV. 1-1-10: MINOR SPACING DETAILS TO EC-STR-4B. REVISED GENERAL NOTES.
- REV. 8-1-12: REVISED GENERAL NOTES.

LIMITS OF FLOW

DITCH SIDESLOPES (SEE NOTE ①)	②X_1 OR X_2 (FT)	TOTAL AVAILABLE SURFACE AREA OF FABRIC IN DITCH AT 18 INCHES OF FLOW DEPTH (FT^2)	① MAXIMUM ALLOWABLE PEAK FLOW (CFS)
2:1	4.2	6.4	1.9
3:1	6.4	9.5	2.8
4:1	8.5	12.7	3.7
5:1	10.6	15.9	4.6
6:1	12.7	19.1	5.6
7:1	14.8	22.3	6.5
8:1	17.0	25.4	7.4
9:1	19.1	28.6	8.3
10:1	21.2	31.8	9.3

① BASED ON 110 GPM/FT^2 (0.02 INCHES/SEC PERMEABILITY) ENHANCED SILT FENCE, DITCH CHECK FABRIC AND TRIANGULAR DITCH CROSS SECTION. SEE STANDARD DRAWING EC-STR-3D FOR FABRIC SPECIFICATIONS. A HEAD OF 18 INCHES BEHIND THE FENCE WAS USED TO DETERMINE MAXIMUM ALLOWABLE DESIGN PEAK FLOW THROUGH THE FILTER FABRIC. ALLOWABLE FLOWS DO NOT INCLUDE HYDRAULIC REDUCTION DUE TO ACCUMULATION OF CAPTURED SOIL PARTICLES ON THE FABRIC SURFACE AREA.

② LENGTHS Y_1 AND Y_2 ARE BASED ON PERPENDICULAR SLOPE LENGTHS TO A POINT WHERE THE BASE OF THE POST ENTERING THE GROUND IS AT THE SAME ELEVATION AS A POINT 18 INCHES ABOVE THE GROUND AT THE LOW POINT OF THE DITCH. LENGTHS X_1 AND X_2 ARE CALCULATED BY MULTIPLYING THE LENGTHS OF THE SLOPE Y_1 OR Y_2 AT EACH INDIVIDUAL LOCATION BY 1.414.

EROSION CONTROL PLAN LEGEND: > ENHANCED SILT FENCE CHECK (V-DITCH)

ENHANCED SILT FENCE CHECK GENERAL NOTES

Ⓐ ENHANCED SILT FENCE CHECKS ARE USED TO REMOVE SUSPENDED SEDIMENTS FROM STORM WATER FLOW VIA SETTLING AND FILTRATION. THEY ARE ALSO USED FOR VELOCITY REDUCTION. ENHANCED SILT FENCE CHECKS SHOULD NOT BE PLACED IN STREAMS OR OTHER NATURAL WATER RESOURCES. ENHANCED SILT FENCE CHECKS SHOULD NOT BE USED WITHIN THE CLEAR ZONE OF A ROADWAY WHERE TRAFFIC IS TO BE MAINTAINED DURING CONSTRUCTION.

Ⓑ A DITCH WITH A TRIANGULAR CROSS-SECTION IS ASSUMED WITH SIDE SLOPES AS NOTED.

Ⓒ SELECT DITCH SIDE SLOPES FROM THE "LIMITS OF FLOW" TABLE SUCH THAT THE MAXIMUM ALLOWABLE DESIGN PEAK FLOW OBTAINED FROM THE APPROPRIATE COLUMN AT THE RIGHT SIDE OF THE TABLE IS EQUAL TO OR GREATER THAN THE 2-YEAR, 24-HOUR FLOW RATE AT THE CHECK. IF THE SITE DRAINS TO A SEDIMENT-IMPAIRED STREAM OR EXCEPTIONAL TENNESSEE WATERS, THE FLOW OBTAINED FROM THE TABLE MUST BE EQUAL TO OR GREATER THAN THE 5-YEAR, 24-HOUR FLOW RATE. FLOWS IN EXCESS OF THESE VALUES MAY BE PASSED OVER THE WEIR.

Ⓓ IT MAY BE NECESSARY TO FLATTEN THE DITCH SIDE SLOPES AND/OR WIDEN THE DITCH BOTTOM WIDTH IN THE VICINITY OF THE CHECK IN ORDER TO ACHIEVE THE SURFACE AREA OF FABRIC REQUIRED FOR THE CHECK. REFER TO EC-STR-4B.

Ⓔ THE SPACING OF ENHANCED SILT FENCE CHECK ALONG A DITCH SHOULD BE BASED ON A COMBINATION OF HYDRAULIC PROPERTIES OF THE FENCE MATERIAL, THE LENGTH OF FLOW TABLE, AND THE SPACING TABLE (EC-STR-4B).

Ⓕ THE FLOW VALUES IN THE LENGTH OF FLOW TABLE ASSUME NO CLOGGING OF THE ENHANCED SILT FENCE CHECK FABRIC SURFACE. IN ORDER TO INSURE MINIMAL INFLUENCE FROM CLOGGING, ENHANCED SILT FENCE CHECKS SHOULD BE REGULARLY CLEANED BY DRY BRUSHING AND/OR PRESSURE WASHING THE FABRIC SURFACE.

Ⓖ FOR INSTALLATION DETAILS FOR ENHANCED SILT FENCE SEE STANDARD DRAWINGS EC-STR-3D AND EC-STR-3E.

Ⓗ UPON REMOVAL OF THE ENHANCED SILT FENCE CHECK THE AREA BENEATH THE ENHANCED SILT FENCE CHECK LOCATION SHOULD BE IMMEDIATELY COVERED WITH SEEDING AND EROSION CONTROL BLANKETS ON TURF REINFORCEMENT MATS OR IT SHOULD BE SODDED.

Ⓘ ANY PRODUCT LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE MAY ALSO BE USED.

Ⓙ ENHANCED SILT FENCE CHECKS SHOULD BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-08.05 ENHANCED SILT FENCE CHECK (V-DITCH) PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE ENHANCED SILT FENCE CHECK.

Ⓚ SEDIMENT SHALL BE REMOVED FROM BEHIND THE ENHANCED SILT FENCE CHECK WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT TO THE STRUCTURE AND PAID FOR UNDER ITEM NO. 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

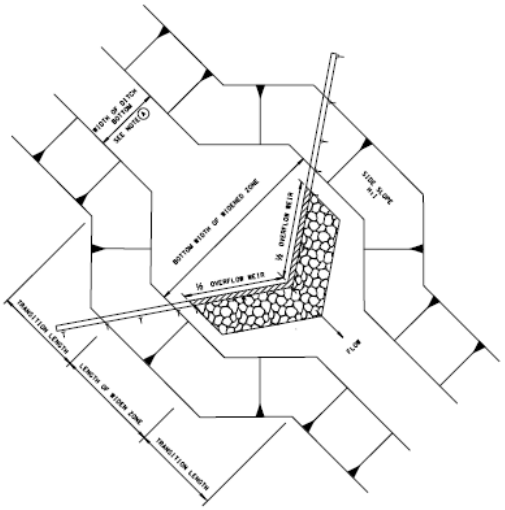
ENHANCED SILT FENCE CHECK (V-DITCH)

12-28-02 EC-STR-4A

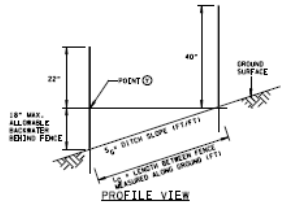
STATION (LT or RT)	L (FT) (1)	X1 (FT) (1)	X2 (FT) (1)	OVERFLOW WEIR LENGTH (FT)	TOTAL LENGTH OF ESF (FT)	WIDENED ZONE				
						BOTTOM WIDTH (FT)	SIDE SLOPE (H:1)	LENGTH (FT)	TRANSITION RATIO	TRANSITION LENGTH (FT)

(1) REFER TO STD. DWG. EC-STR-4 OR EC-STR-4A

DITCH SLOPE S_D(FT/FT)	RECOMMENDED SPACING, (L_S) BETWEEN ENHANCED SILT FENCE CHECKS(FT)
0.01	150
0.02	75
0.03	50
0.04	40
0.05	30
0.06 AND STEEPER	25



PLAN VIEW



PROFILE VIEW

SPACING FOR ENHANCED SILT FENCE CHECKS

ENHANCED SILT FENCE CHECK GENERAL NOTES

(A) ENHANCED SILT FENCE CHECKS ARE USED TO REMOVE SUSPENDED SEDIMENTS FROM STORM WATER FLOW VIA SETTLING AND FILTRATION. THEY ARE ALSO USED FOR VELOCITY REDUCTION. ENHANCED SILT FENCE CHECKS SHOULD NOT BE PLACED IN STREAMS OR OTHER NATURAL WATER RESOURCES.

(B) IT MAY BE NECESSARY TO FLATTEN THE DITCH SIDE SLOPES AND/OR WIDEN THE DITCH BOTTOM WIDTH IN THE VICINITY OF THE CHECK IN ORDER TO ACHIEVE THE SURFACE AREA OF FABRIC REQUIRED FOR THE CHECK. REFER TO LOWEST OF FLOW TABLE ON EC-STR-4 AND EC-STR-4A.

(C) FOR ADDITIONAL INSTALLATION INFORMATION REFER TO EC-STR-4 FOR ENHANCED SILT FENCE CHECK USED IN TRAPEZOIDAL DITCHES AND EC-STR-4A FOR ENHANCED SILT FENCE CHECKS USED IN V-DITCHES.

(D) FOR INSTALLATION DETAILS FOR ENHANCED SILT FENCE SEE STANDARD DRAWING EC-STR-3D AND EC-STR-3E.

(E) THE SPACING OF ENHANCED SILT FENCE CHECKS, ALONG A DITCH SHOULD BE BASED ON A COMBINATION OF HYDRAULIC PROPERTIES OF THE FENCE MATERIAL, LENGTH OF FLOW TABLE (EC-STR-4 AND EC-STR-4A), AND THE SPACING TABLE.

(F) UPON REMOVAL OF THE ENHANCED SILT FENCE CHECK THE WIDENED ZONE SHOULD BE IMMEDIATELY RESHAPED TO MATCH THE PROPOSED DITCH SIZE. IT SHOULD BE COVERED WITH SEEDING AND EROSION CONTROL BLANKETS OR TURF REINFORCEMENT MATS OR IT SHOULD BE SODDED.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

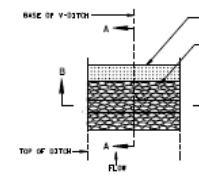
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

ENHANCED SILT FENCE CHECK DETAILS

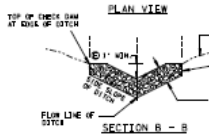
01-01-10 EC-STR-4B

☐ REV. 8-1-13: ADDED NOTE REFERENCE TO PLAN VIEW.

DETAIL FOR V-DITCH

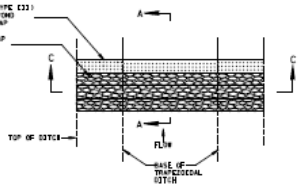


PLAN VIEW

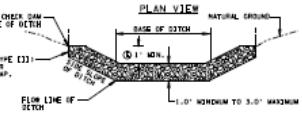


SECTION B - B

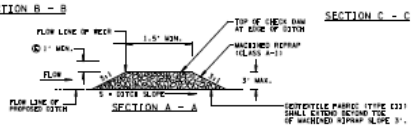
DETAIL FOR TRAPEZOIDAL DITCH



PLAN VIEW

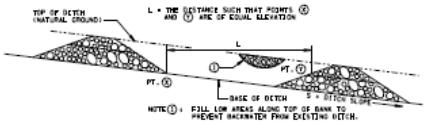


SECTION C - C



SECTION A - A

DETAIL FOR SPACING BETWEEN CHECK DAMS



NOTE (1): FILL LOW AREAS ALONG TOP OF BANK TO PREVENT BACKWATER FROM EXISTING DITCH.

ROCK CHECK DAM ESTIMATED QUANTITIES

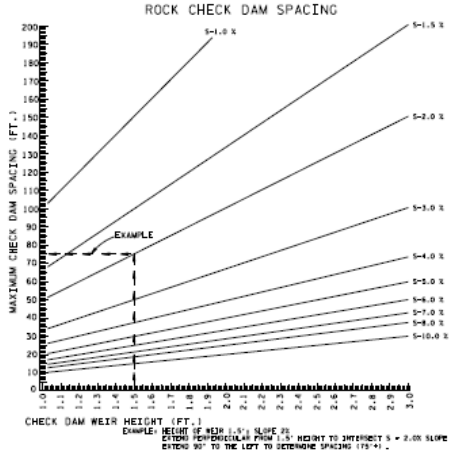
	2:1 DITCH SLOPE			3:1 DITCH SLOPE			4:1 DITCH SLOPE		
V-DITCH	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF
	1.5	6.3	15.8	1.5	9.2	23.7	1.5	12.0	30.9
	2.0	13.0	34.5	2.0	18.4	54.3	2.0	24.1	65.4
	2.5	22.8	59.5	2.5	32.3	86.0	2.5	42.1	92.5
	3.0	36.5	44.1	3.0	51.7	83.2	3.0	67.3	82.5
TRAPEZOIDAL DITCH	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF	HEIGHT FT	RIP RAP TON	GEOTEXTILE SF
	1.5	8.9	20.8	1.5	11.6	29.7	1.5	14.4	36.9
	2.0	16.5	31.3	2.0	22.1	42.1	2.0	27.5	52.7
	2.5	28.7	42.9	2.5	38.1	56.6	2.5	47.9	71.2
	3.0	46.7	56.7	3.0	59.8	73.2	3.0	75.3	92.4

1. ESTIMATED QUANTITIES BASED ON 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.
2. ESTIMATED QUANTITIES BASED ON 4FT BOTTOM WIDTH, AND 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.

EROSION CONTROL PLAN LEGEND : ROCK CHECK DAM (V-DITCH)

EROSION CONTROL PLAN LEGEND : ROCK CHECK DAM (TRAPEZOIDAL DITCH)

ROCK CHECK DAM SPACING



☐ REV. 12-19-99: CHANGED DRAWING NO. FROM EC-STR-4 TO EC-STR-4C.

☐ REV. 7-28-05: MADE MINOR CORRECTIONS TO GENERAL NOTES.

☐ REV. 4-19-06: CHANGED PAY ITEMS FOR CHECK DAMS.

☐ REV. 8-8-06: CHANGED DESCRIPTION FOR GEOTEXTILE FABRIC (TYPE (3)). (CLASS A) TO GEOTEXTILE FABRIC (TYPE 232).

☐ REV. 12-18-07: CHANGED GENERAL NOTE (2).

☐ REV. 1-28-08: CORRECTED NOTE IN SECTION B-B.

☐ REV. 4-17-08: REFORMATTED SHEET. REVISED NOTES. MISC. EDITS TO DRAWING.

☐ REV. 6-1-09: REMOVED TEMPORARY REFERENCE. REVISED NOTES. MISC. EDITS TO DRAWING. MODIFIED SPACING CHART.

☐ REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.

☐ REV. 5-5-14: REVISED QUANTITIES TABLE. REVISED GENERAL NOTE (1). REVISED DITCH DETAIL.

ROCK CHECK DAM GENERAL NOTES

(A) ROCK CHECK DAMS ARE TO BE USED FOR VELOCITY REDUCTION AND EROSION PREVENTION IN AREAS WHERE CONCENTRATED FLOW EXISTS. ROCK CHECK DAMS SHALL NOT BE USED IN STREAMS OR OTHER NATURAL WATER RESOURCES. ROCK CHECK DAMS ARE NOT TO BE USED FOR SEDIMENT CONTROL AND SHOULD NOT BE CONSIDERED A SEDIMENT TRAPPING DEVICE.

(B) THE DRAINAGE AREA FOR THE ROCK CHECK DAMS SHALL BE 10 ACRES OR LESS.

(C) ROCK CHECK DAMS MAY REMAIN IN PLACE AS PERMANENT CHECK DAMS, IF SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

(D) THE CENTER OF THE ROCK CHECK DAM MUST BE AT LEAST ONE (1) FOOT LOWER THAN THE OUTER EDGES.

(E) THE DEPTH OF FLOW ON THE CENTER OF THE STRUCTURE SHALL BE COMPUTED FOR THE PEAK FLOW RATE GENERATED BY THE 2-YEAR, 24-HOUR STORM IN ORDER TO ENSURE THAT THE TOP OF THE STRUCTURE WILL NOT BE OVERTOPPED. FOR SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, THE DEPTH SHOULD BE DETERMINED FOR THE 5-YEAR, 24-HOUR PEAK FLOW RATE. THIS WILL ELIMINATE THE ROCK-SOIL FAILURE POINT WHERE THE ROCK CHECK DAM AND NATURAL GROUND MERGE.

(F) FOR SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, THE MAXIMUM HEIGHT OF THE STRUCTURE ABOVE THE DITCH BOTTOM SHALL BE INCREASED TO 2 FEET.

(G) THE MAXIMUM SPACING BETWEEN ROCK CHECK DAMS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE FLOW LINE OF THE WEIR OF THE DOWNSTREAM DAM (SEE ROCK CHECK SPACING CHART ON THIS SHEET).

(H) ONLY GEOTEXTILE FABRIC (TYPE (3)) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(I) PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST FOR FILTER SOCK DITCH APPLICATION MAY BE USED AND SHALL BE PAID UNDER FOLLOWING ITEM NUMBER:

209-08.09 FILTER SOCK CHECK DAM PER EACH

(J) ROCK CHECK DAMS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

209-08.07 ROCK CHECK DAM PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF ROCK CHECK DAMS.

(K) SEDIMENT SHALL BE REMOVED FROM BEHIND THE ROCK CHECK DAMS WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE DAM AND PAID FOR UNDER ITEM NUMBER 209-05. SEDIMENT REMOVAL PER CUBIC YARD.

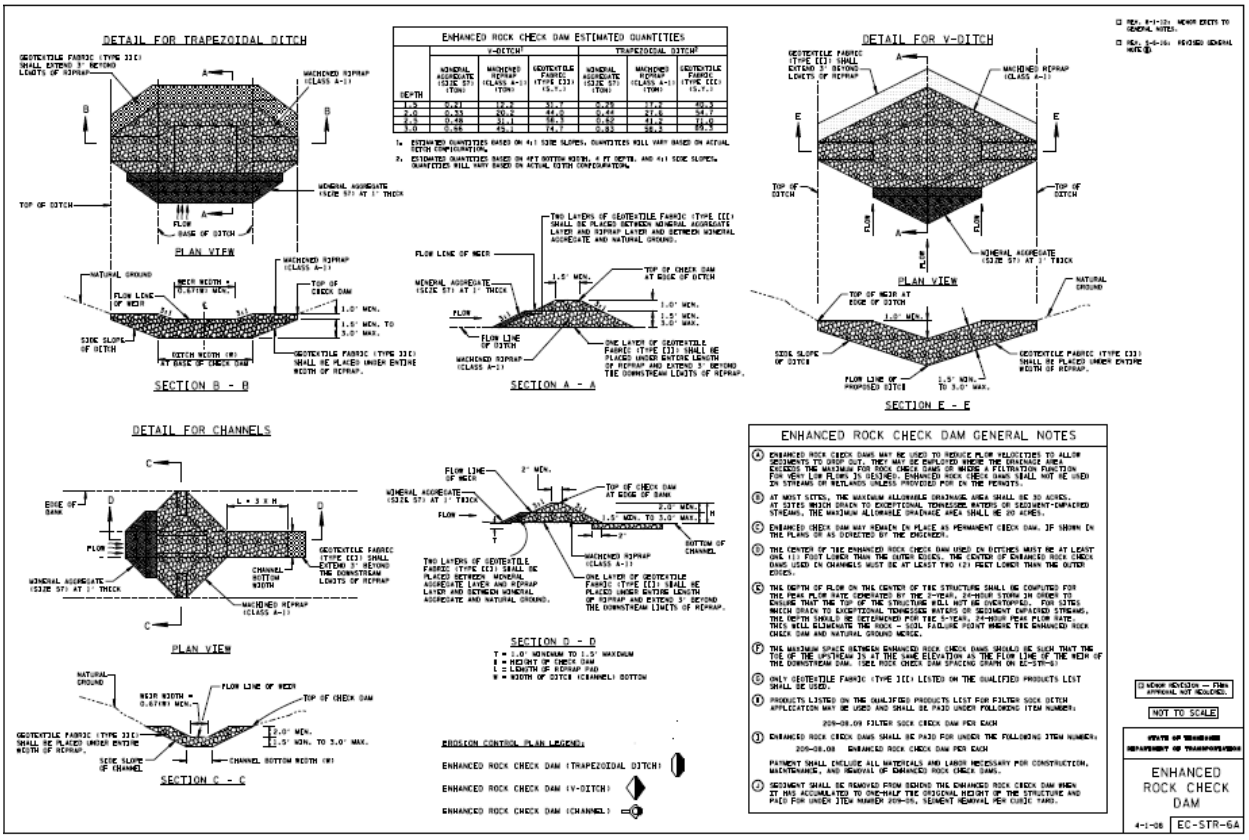
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

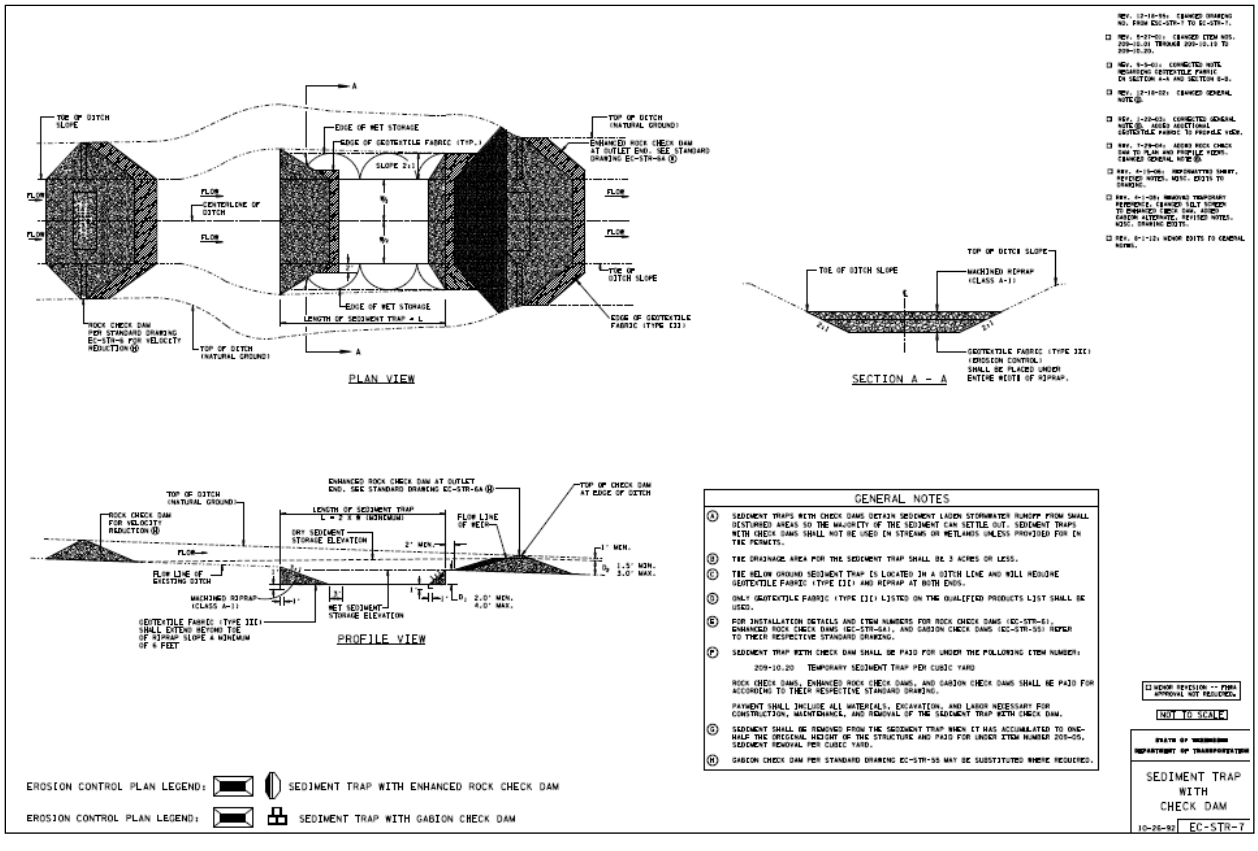
NOT TO SCALE

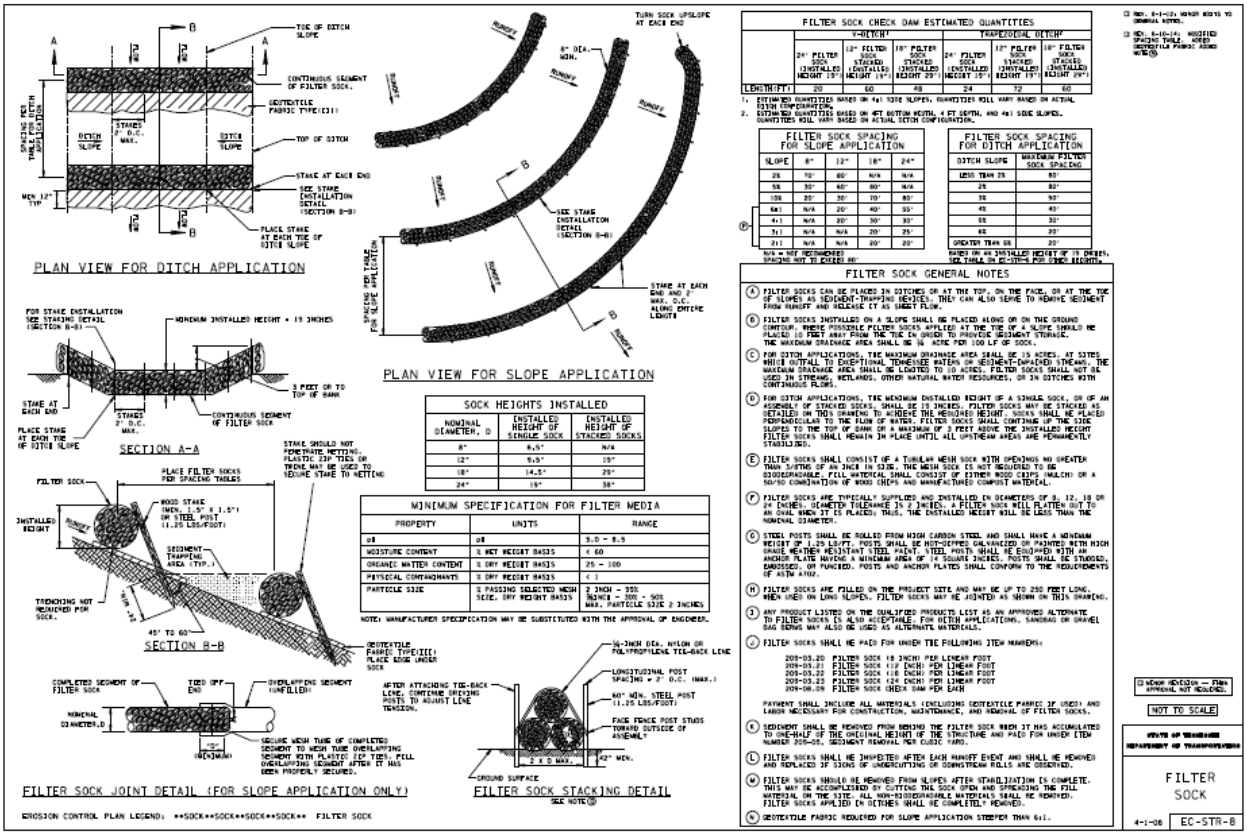
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

ROCK CHECK DAM

10-26-92 EC-STR-6


DETAIL FOR TRAPEZOIDAL DITCH
ENHANCED ROCK CHECK DAM ESTIMATED QUANTITIES
V-DITCH[1]
TRAPEZOIDAL DITCH[2]
MINERAL AGGREGATE (SIZE 57) (TON)
MACHINED RIPRAP (CLASS A-1) (TON)
GEOTEXTILE FABRIC (TYPE 33) (SY)
MINERAL AGGREGATE (SIZE 57) (TON)
MACHINED RIPRAP (CLASS A-1) (TON)
GEOTEXTILE FABRIC (TYPE 33) (SY)
DEPTH
1.5
2.0
2.5
3.0
1. ESTIMATED QUANTITIES BASED ON 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.
2. ESTIMATED QUANTITIES BASED ON 4FT BOTTOM WIDTH, 4 FT DEPTH, AND 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.
PLAN VIEW
SECTION B - B
SECTION A - A
DETAIL FOR V-DITCH
PLAN VIEW
SECTION E - E
DETAIL FOR CHANNELS
PLAN VIEW
SECTION D - D
SECTION C - C
EROSION CONTROL PLAN LEGEND:
ENHANCED ROCK CHECK DAM (TRAPEZOIDAL DITCH)
ENHANCED ROCK CHECK DAM (V-DITCH)
ENHANCED ROCK CHECK DAM (CHANNEL)
ENHANCED ROCK CHECK DAM GENERAL NOTES
ENHANCED ROCK CHECK DAMS
NOT TO SCALE
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION
ENHANCED ROCK CHECK DAM
4-1-08
EC-STR-6A


PLAN VIEW
SECTION A - A
PROFILE VIEW
EROSION CONTROL PLAN LEGEND:
SEDIMENT TRAP WITH ENHANCED ROCK CHECK DAM
EROSION CONTROL PLAN LEGEND:
SEDIMENT TRAP WITH GABION CHECK DAM
GENERAL NOTES
NOT TO SCALE
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION
SEDIMENT TRAP WITH CHECK DAM
10-26-92
EC-STR-7



FILTER SOCK CHECK DAM ESTIMATED QUANTITIES

	V-DITCH			TRAPEZOIDAL DITCH		
	24" FILTER SOCK (INSTALLED HEIGHT 19")	12" FILTER SOCK STACKED (INSTALLED HEIGHT 19")	18" FILTER SOCK STACKED (INSTALLED HEIGHT 29")	24" FILTER SOCK (INSTALLED HEIGHT 19")	12" FILTER SOCK STACKED (INSTALLED HEIGHT 19")	18" FILTER SOCK STACKED (INSTALLED HEIGHT 29")
LENGTH (FT)	20	60	60	24	72	60

1. ESTIMATED QUANTITIES BASED ON 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.
2. ESTIMATED QUANTITIES BASED ON 4FT BOTTOM WIDTH, 4 FT DEPTH, AND 4:1 SIDE SLOPES. QUANTITIES WILL VARY BASED ON ACTUAL DITCH CONFIGURATION.

FILTER SOCK SPACING FOR SLOPE APPLICATION

SLOPE	8"	12"	18"	24"
2%	70'	80'	N/A	N/A
5%	30'	60'	80'	N/A
10%	20'	30'	70'	80'
6:1	N/A	20'	40'	55'
4:1	N/A	20'	30'	35'
3:1	N/A	N/A	20'	25'
2:1	N/A	N/A	20'	20'

N/A = NOT RECOMMENDED

FILTER SOCK SPACING FOR DITCH APPLICATION

DITCH SLOPE	MAXIMUM FILTER SOCK SPACING
LESS THAN 3%	80'
3%	80'
4%	60'
5%	40'
6%	40'
GREATER THAN 6%	20'

BASED ON AN INSTALLED HEIGHT OF 19 INCHES. SEE TABLE IN EC-STR-8 FOR OTHER HEIGHTS.

SOCK HEIGHTS INSTALLED

NOMINAL DIAMETER, D	INSTALLED HEIGHT OF SINGLE SOCK	INSTALLED HEIGHT OF STACKED SOCKS
8"	6.5"	N/A
12"	9.5"	19"
18"	14.5"	29"
24"	19"	38"

MINIMUM SPECIFICATION FOR FILTER MEDIA

PROPERTY	UNITS	RANGE
pH	pH	5.0 - 8.5
MOISTURE CONTENT	% WET WEIGHT BASIS	< 60
ORGANIC MATTER CONTENT	% DRY WEIGHT BASIS	25 - 100
PHYSICAL CONTAMINANTS	% DRY WEIGHT BASIS	< 1
PARTICLE SIZE	% PASSING SELECTED MESH SIZE, DRY WEIGHT BASIS	2 INCH - 95% 3/8INCH - 70% - 90% MAX. PARTICLE SIZE 2 INCHES

NOTE: MANUFACTURER SPECIFICATION MAY BE SUBSTITUTED WITH THE APPROVAL OF ENGINEER.

FILTER SOCK GENERAL NOTES

(A) FILTER SOCKS CAN BE PLACED IN DITCHES OR AT THE TOP, ON THE FACE, OR AT THE TOE OF SLOPES AS SEDIMENT-TRAPPING DEVICES. THEY CAN ALSO SERVE TO REMOVE SEDIMENT FROM RUNOFF AND RELEASE IT AS SHEET FLOW.

(B) FILTER SOCKS INSTALLED ON A SLOPE SHALL BE PLACED ALONG OR ON THE GROUND CONTOUR. WHERE POSSIBLE FILTER SOCKS APPLIED AT THE TOE OF A SLOPE SHALL BE PLACED 10 FEET AWAY FROM THE TOE (+) ORDER TO PROVIDE SEDIMENT STORAGE. THE MAXIMUM DRAINAGE AREA SHALL BE ¼ ACRE PER 100 LF OF SOCK.

(C) FOR DITCH APPLICATIONS, THE MAXIMUM DRAINAGE AREA SHALL BE 10 ACRES. AT SITES WITH OUTFALL TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, THE MAXIMUM DRAINAGE AREA SHALL BE LIMITED TO 10 ACRES. FILTER SOCKS SHALL NOT BE USED IN STREAMS, WETLANDS, OTHER NATURAL WATER RESOURCES, OR IN DITCHES WITH CONTINUOUS FLOWS.

(D) FOR DITCH APPLICATIONS, THE MINIMUM INSTALLED HEIGHT OF A SINGLE SOCK, OR OF AN ASSEMBLY OF STACKED SOCKS, SHALL BE 19 INCHES. FILTER SOCKS MAY BE STACKED AS DETAILED ON THIS DRAWING TO ACHIEVE THE REQUIRED HEIGHT. SOCKS SHALL BE PLACED PERPENDICULAR TO THE FLOW OF WATER. FILTER SOCKS SHALL CONTINUE UP THE SIDE SLOPES TO THE TOP OF BANK OR A MAXIMUM OF 2 FEET ABOVE THE INSTALLED HEIGHT FILTER SOCKS SHALL REMAIN IN PLACE UNTIL ALL UPSTREAM AREAS ARE PERMANENTLY STABILIZED.

(E) FILTER SOCKS SHALL CONSIST OF A TUBULAR MESH SOCK WITH OPENINGS NO GREATER THAN 5/8THS OF AN INCH IN SIZE. THE MESH SOCK IS NOT REQUIRED TO BE BIODEGRADABLE. FILL MATERIAL SHALL CONSIST OF EITHER WOOD CHIPS (MULCH) OR A 50/50 COMBINATION OF WOOD CHIPS AND MANUFACTURED COMPOST MATERIAL.

(F) FILTER SOCKS ARE TYPICALLY SUPPLIED AND INSTALLED IN DIAMETERS OF 8, 12, 18 OR 24 INCHES, DIAMETER TOLERANCE IS ± 2 INCHES. A FILTER SOCK WILL FLATTEN OUT TO AN OVAL WHEN IT IS PLACED. THUS, THE INSTALLED HEIGHT WILL BE LESS THAN THE NOMINAL DIAMETER.

(G) STEEL POSTS SHALL BE ROLLED FROM HIGH CARBON STEEL AND SHALL HAVE A MINIMUM WEIGHT OF 1.25 LB/FT. POSTS SHALL BE HOT-DIPPED GALVANIZED OR PAINTED WITH HIGH GRADE WEATHER RESISTANT STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH AN ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR FUNCHED. POSTS AND ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.

(H) FILTER SOCKS ARE FILLED ON THE PROJECT SITE AND MAY BE UP TO 250 FEET LONG, WHEN USED ON LONG SLOPES. FILTER SOCKS MAY BE JOINTED AS SHOWN ON THIS DRAWING.

(I) ANY PRODUCT LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE TO FILTER SOCKS IS ALSO ACCEPTABLE. FOR DITCH APPLICATIONS, SANDBAG OR GRAVEL BAG BERMS MAY ALSO BE USED AS ALTERNATE MATERIALS.

(J) FILTER SOCKS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-05.20 FILTER SOCK (8 INCH) PER LINEAR FOOT
209-05.21 FILTER SOCK (12 INCH) PER LINEAR FOOT
209-05.22 FILTER SOCK (18 INCH) PER LINEAR FOOT
209-05.23 FILTER SOCK (24 INCH) PER LINEAR FOOT
209-06.09 FILTER SOCK INCH DIA PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS (EXCLUDING GEOTEXTILE FABRIC IF USED) AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF FILTER SOCKS.

(K) SEDIMENT SHALL BE REMOVED FROM BEHIND THE FILTER SOCK WHEN IT HAS ACCUMULATED TO ONE-HALF OF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

(L) FILTER SOCKS SHALL BE INSPECTED AFTER EACH RUNOFF EVENT AND SHALL BE REMOVED AND REPLACED IF SIGNS OF UNDERCUTTING OR DOWNSTREAM ROLLS ARE OBSERVED.

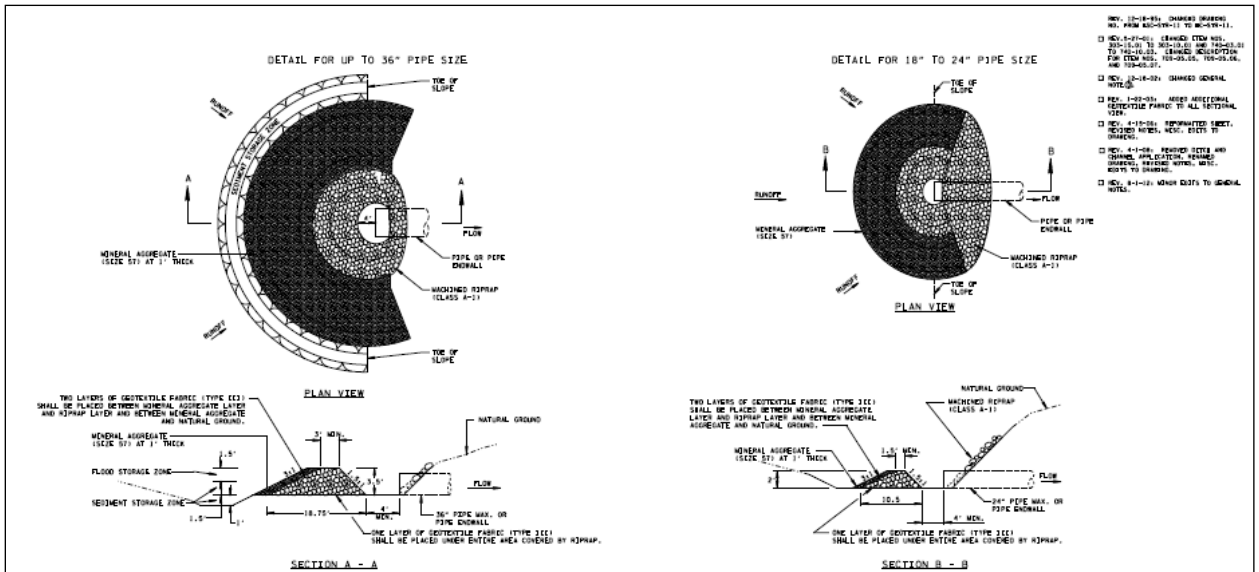
(M) FILTER SOCKS SHOULD BE REMOVED FROM SLOPES AFTER STABILIZATION IS COMPLETE. THIS MAY BE ACCOMPLISHED BY CUTTING THE SOCK OPEN AND SPREADING THE FILL MATERIAL ON THE SITE. ALL NON-BIODEGRADABLE MATERIALS SHALL BE REMOVED. FILTER SOCKS APPLIED IN DITCHES SHALL BE COMPLETELY REMOVED.

(N) GEOTEXTILE FABRIC REQUIRED FOR SLOPE APPLICATION STEEPER THAN 6:1.

EROSION CONTROL PLAN LEGEND: **SOCK**SOCK**SOCK**SOCK** FILTER SOCK

REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.
REV. 6-16-14: MODIFIED SPACING TABLE. ADDED BIODEGRADABLE FABRIC ADDED NOTE (N)

☐ MINOR REVISION — FHWA APPROVAL NOT REQUIRED.
NOT TO SCALE
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION
FILTER SOCK
4-1-08 EC-STR-8



CULVERT PROTECTION TYPE 1 GENERAL NOTES

(A) CULVERT PROTECTION (TYPE 1) MAY BE USED AROUND A CULVERT INLET TO REDUCE FLOW VELOCITIES TO ALLOW SEDIMENTS TO DROP OUT. IT IS NORMALLY USED WHERE ALL OF THE INFLOW TO THE CULVERT IS ON-SITE RUNOFF. CT MAY ALSO BE USED WHERE A FILTRATION FUNCTION FOR VERY LOW FLOWS IS DESIRED.

(B) CULVERT PROTECTION (TYPE C) SHALL NOT BE USED IN STREAMS OR OTHER NATURAL WATER RESOURCES, UNLESS PROVIDED FOR IN THE PERMITS.

(C) CULVERT PROTECTION (TYPE C) SHOULD NOT BE USED IN DITCHES, SWALES, OR OTHER DEPRESSIONS WITH A DEPTH GREATER THAN 1 FOOT.

(D) CULVERT PROTECTION (TYPE) SHOULD NOT BE USED AT THE CULVERT OUTLET.

(E) WHERE CONDITIONS OF HIGH SEDIMENT FLOW EXIST, MACHINED RIPRAP (CLASS A-3) MAY BE USED IN LIEU OF MACHINED RIPRAP (CLASS A-1) FOR PIPES UP TO 24 INCHES IN DIAMETER WITH A DRAINAGE AREA LESS THAN 3 ACRES. IT MAY ALSO BE USED FOR PIPE FROM 24 INCHES IN DIAMETER WITH A DRAINAGE AREA LESS THAN 5 ACRES.

(F) AT MOST SITES, THE MAXIMUM ALLOWABLE DRAINAGE AREA SHALL BE 30 ACRES. AT SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, THE MAXIMUM ALLOWABLE DRAINAGE AREA SHALL BE 20 ACRES.

(G) ONLY GEOTEXTILE FABRIC (TYPE IIC) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(H) CULVERT PROTECTION (TYPE 1) SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

203-01 ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED) PER CUBIC YARD
303-10.01 MINERAL AGGREGATE (SIZE 57) PER TON
709-05.05 MACHINED RIPRAP (CLASS A-3) PER TON
709-05.06 MACHINED RIPRAP (CLASS A-1) PER TON
740-10.03 GEOTEXTILE (TYPE IIC) (EROSION CONTROL) PER SQUARE YARD

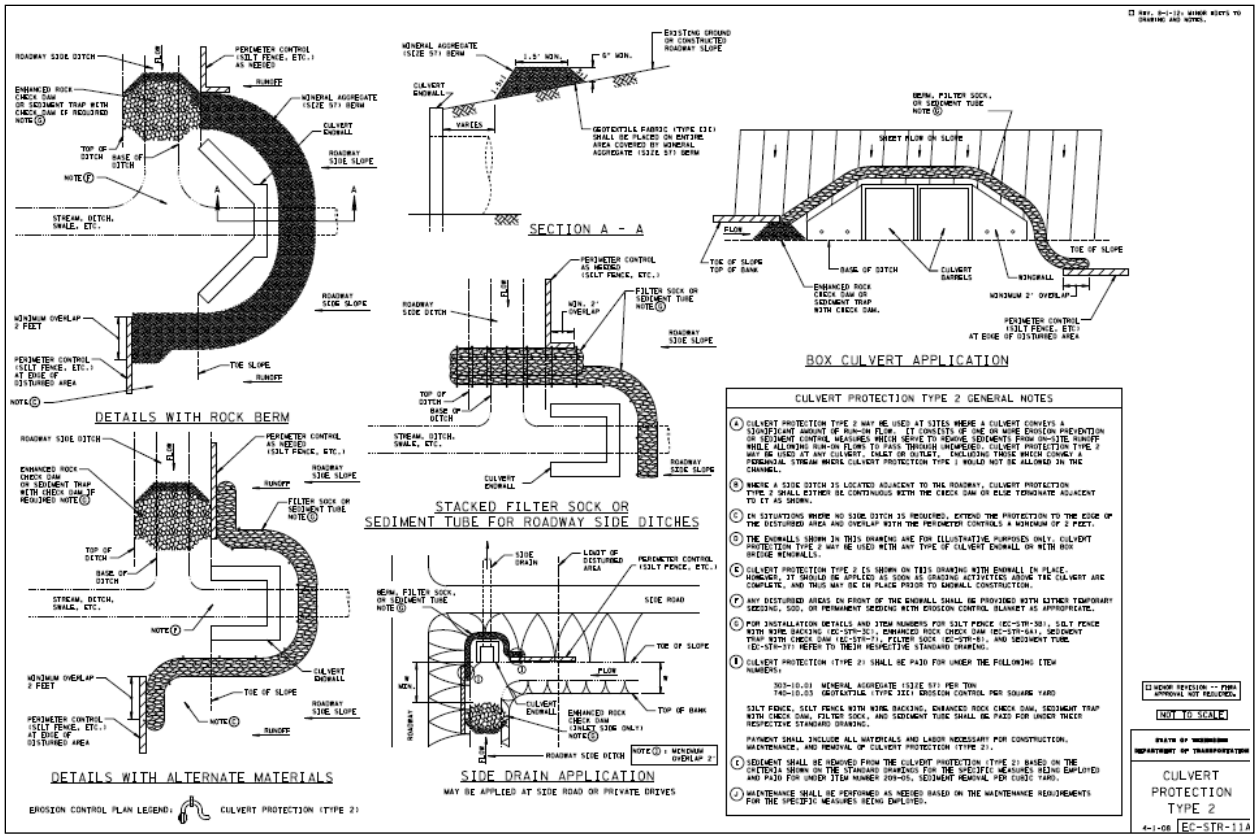
PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF CULVERT PROTECTION (TYPE 1).

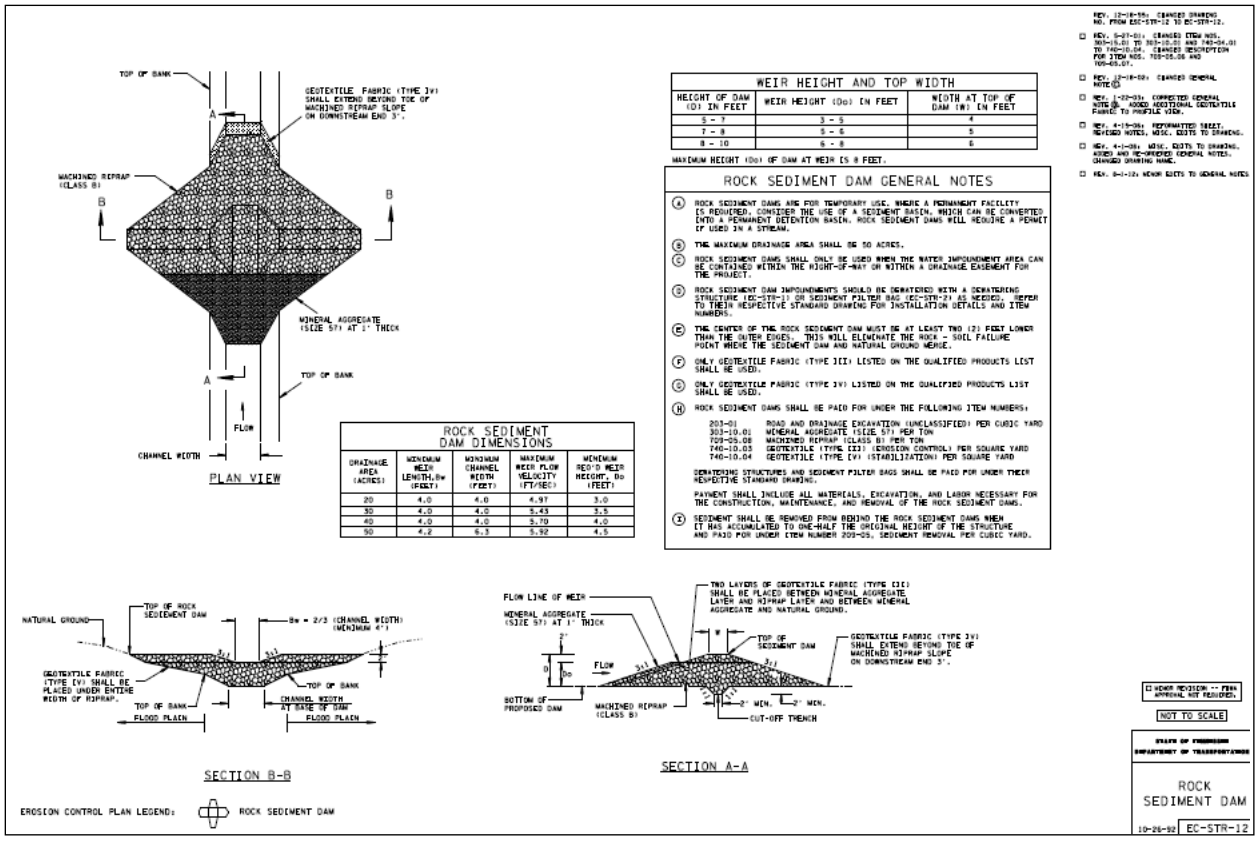
(I) SEDIMENT SHALL BE REMOVED FROM BEHIND THE CULVERT PROTECTION (TYPE 1) WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.

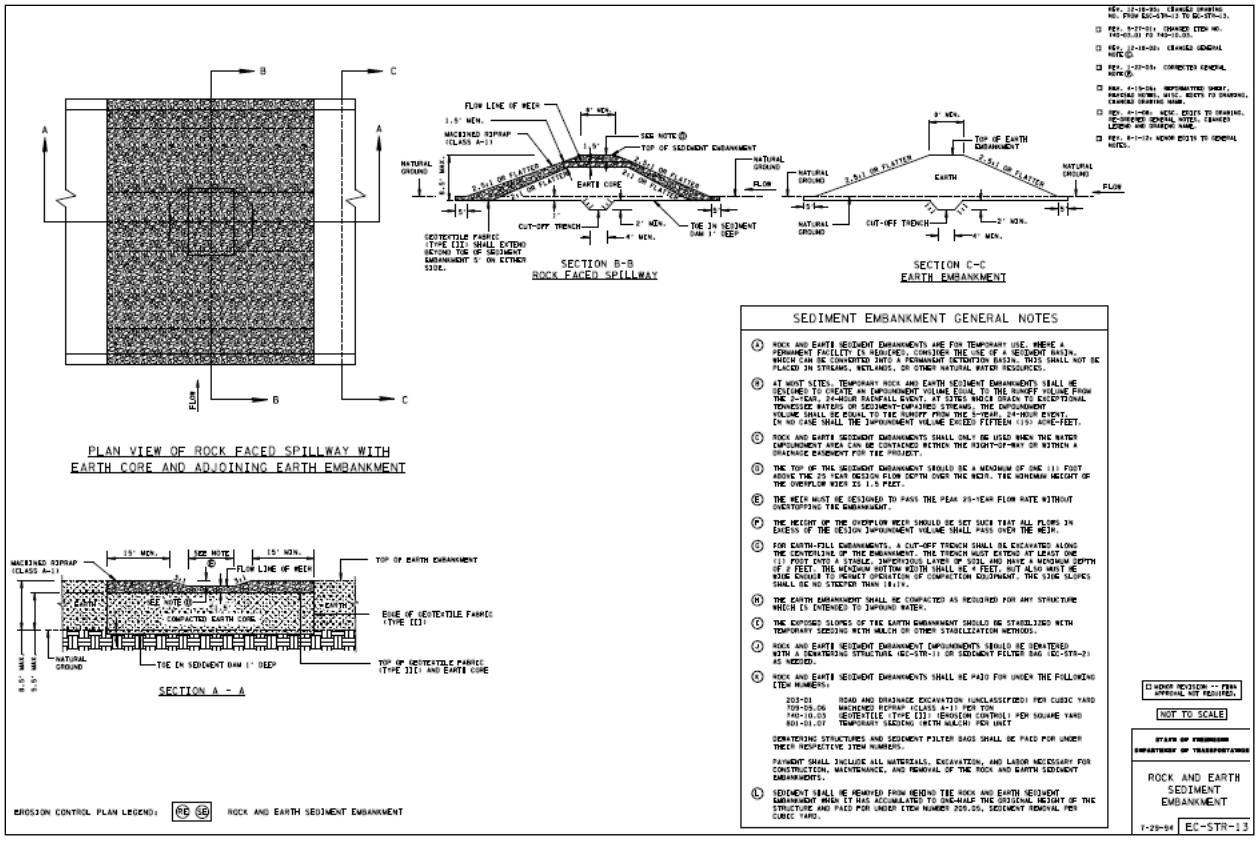
EROSION CONTROL PLAN LEGEND: CULVERT PROTECTION (TYPE 1)

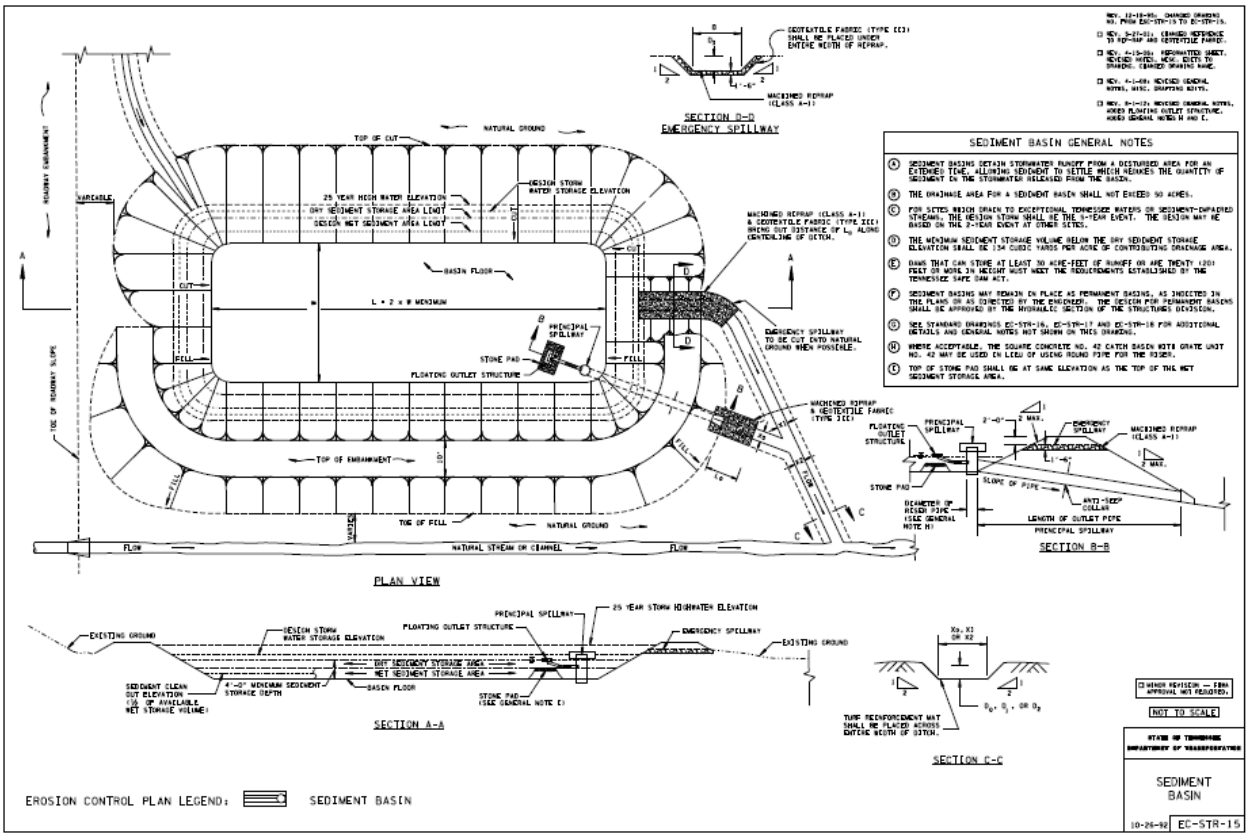
REV. 10-18-95: CHANGED DRAWING NO. FROM EC-STR-11 TO MC-STR-11.
REV. 5-27-01: CHANGED ITEM NOS. 303-10.01 TO 303-10.01 AND 740-03.01 TO 740-10.03. CHANGED DESCRIPTION FOR ITEM NOS. 709-05.05, 709-05.06, AND 709-05.07.
REV. 12-18-02: CHANGED GENERAL NOTE (B).
REV. 1-22-03: ADDED ADDITIONAL GEOTEXTILE FABRIC TO ALL SECTIONAL VIEW.
REV. 4-10-06: REFORMATTED SHEET. REVISED NOTES, MISC. EDITS TO DRAWING.
REV. 4-1-08: REMOVED DITCH AND CHANNEL APPLICATION, REVISED DRAWING, REVISED NOTES, MISC. EDITS TO DRAWING.
REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.

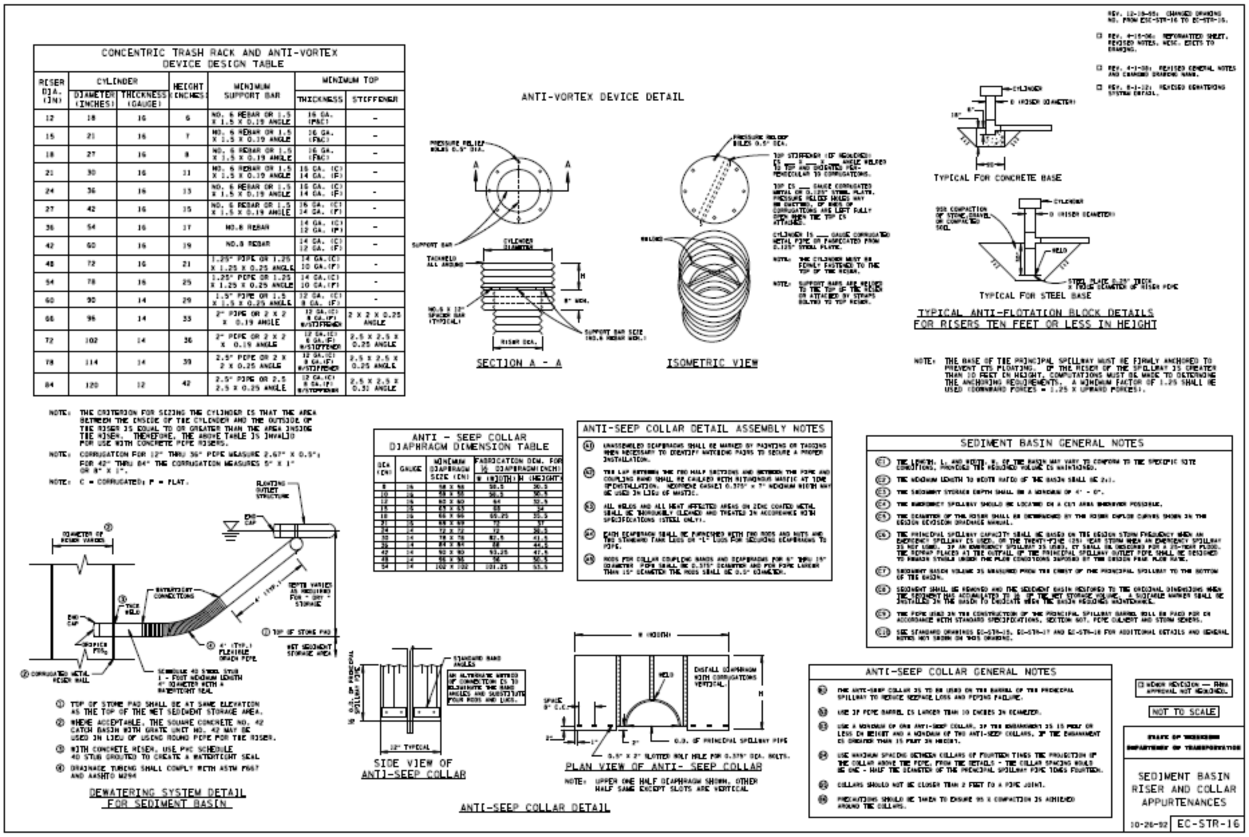
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.
NOT TO SCALE
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION
CULVERT PROTECTION TYPE 1
10-26-92 EC-STR-11


DETAILS WITH ROCK BERM
SECTION A - A
BOX CULVERT APPLICATION
STACKED FILTER SOCK OR SEDIMENT TUBE FOR ROADWAY SIDE DITCHES
DETAILS WITH ALTERNATE MATERIALS
SIDE DRAIN APPLICATION
MAY BE APPLIED AT SIDE ROAD OR PRIVATE DRIVES
EROSION CONTROL PLAN LEGEND:
CULVERT PROTECTION (TYPE 2)
CULVERT PROTECTION TYPE 2 GENERAL NOTES
CULVERT PROTECTION TYPE 2
EC-STR-11A


PLAN VIEW
ROCK SEDIMENT DAM DIMENSIONS
WEIR HEIGHT AND TOP WIDTH
ROCK SEDIMENT DAM GENERAL NOTES
SECTION B-B
SECTION A-A
EROSION CONTROL PLAN LEGEND:
ROCK SEDIMENT DAM
ROCK SEDIMENT DAM
EC-STR-12


PLAN VIEW OF ROCK FACED SPILLWAY WITH EARTH CORE AND ADJOINING EARTH EMBANKMENT
SECTION A - A
SECTION B-B ROCK FACED SPILLWAY
SECTION C-C EARTH EMBANKMENT
SEDIMENT EMBANKMENT GENERAL NOTES
EROSION CONTROL PLAN LEGEND: ROCK AND EARTH SEDIMENT EMBANKMENT
NOT TO SCALE
ROCK AND EARTH SEDIMENT EMBANKMENT
7-29-94 EC-STR-13


PLAN VIEW
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D EMERGENCY SPILLWAY
SEDIMENT BASIN GENERAL NOTES
EROSION CONTROL PLAN LEGEND: SEDIMENT BASIN
NOT TO SCALE
SEDIMENT BASIN
10-26-92 EC-STR-15


CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE DESIGN TABLE

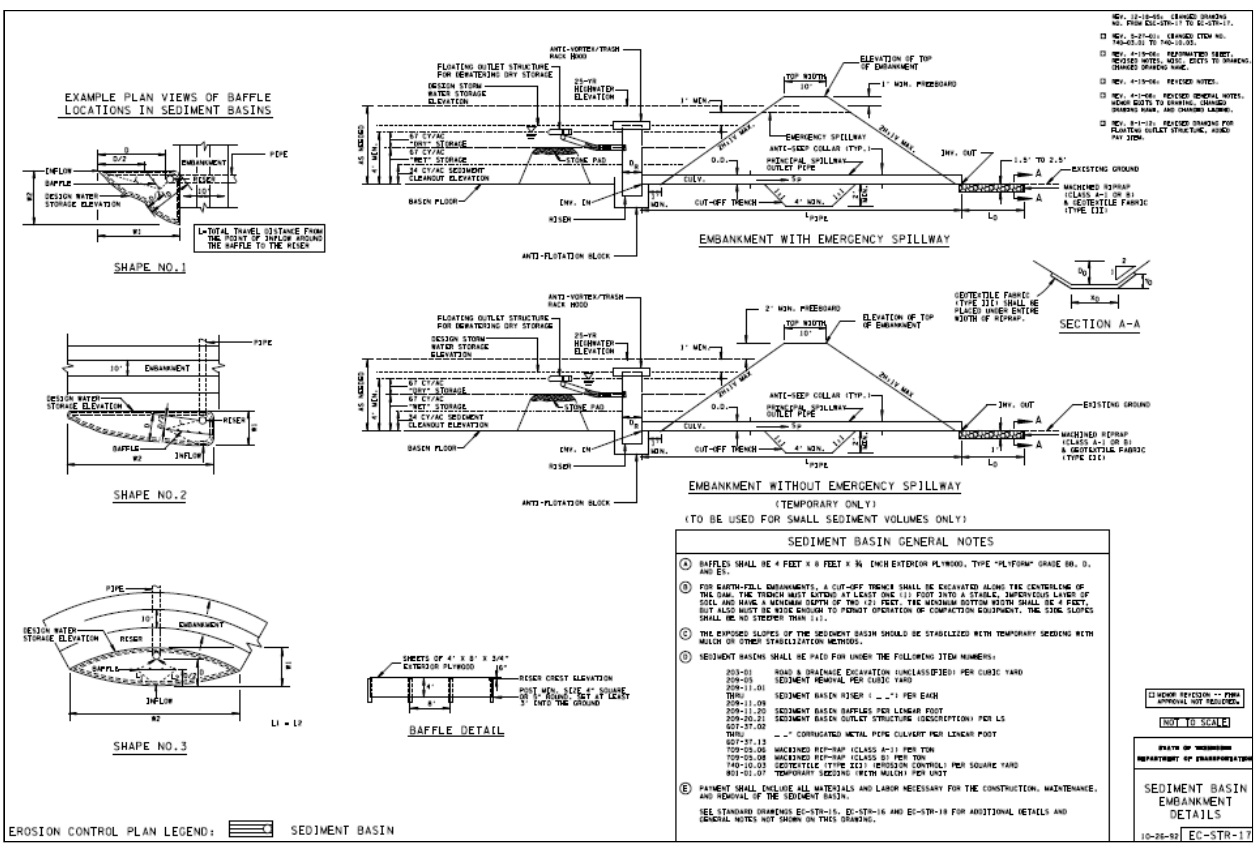
RISER DIA. (IN)	CYLINDER DIAMETER (INCHES)	CYLINDER THICKNESS (GAUGE)	HEIGHT (INCHES)	MINIMUM SUPPORT BAR	MINIMUM TOP THICKNESS	MINIMUM TOP STIFFENER
12	18	16	6	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 ANGLE	16 GA. (F&C)	-
15	21	16	7	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 ANGLE	16 GA. (F&C)	-
18	27	16	8	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 ANGLE	16 GA. (F&C)	-
21	30	16	11	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 ANGLE	16 GA. (C) 14 GA. (F)	-
24	36	16	13	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 ANGLE	16 GA. (C) 14 GA. (F)	-
27	42	16	15	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 ANGLE	16 GA. (C) 14 GA. (F)	-
36	54	16	17	NO.8 REBAR	14 GA. (C) 12 GA. (F)	-
42	60	16	19	NO.8 REBAR	14 GA. (C) 12 GA. (F)	-
48	72	16	21	1.25" PIPE OR 1.25 X 1.25 X 0.25 ANGLE	14 GA.(C) 10 GA.(F)	-
54	78	16	25	1.25" PIPE OR 1.25 X 1.25 X 0.25 ANGLE	14 GA.(C) 10 GA.(F)	-
60	90	14	29	1.5" PIPE OR 1.5 X 1.5 X 0.25 ANGLE	12 GA. (C) 8 GA. (F)	-
66	96	14	33	2" PIPE OR 2 X 2 X 0.19 ANGLE	12 GA.(C) 8 GA.(F) W/STIFFENER	2 X 2 X 0.25 ANGLE
72	102	14	36	2" PIPE OR 2 X 2 X 0.19 ANGLE	12 GA.(C) 8 GA.(F) W/STIFFENER	2.5 X 2.5 X 0.25 ANGLE
78	114	14	39	2.5" PIPE OR 2 X 2 X 0.25 ANGLE	12 GA.(C) 8 GA.(F) W/STIFFENER	2.5 X 2.5 X 0.25 ANGLE
84	120	12	42	2.5" PIPE OR 2.5 2.5 X 0.25 ANGLE	12 GA.(C) 8 GA.(F) W/STIFFENER	2.5 X 2.5 X 0.31 ANGLE

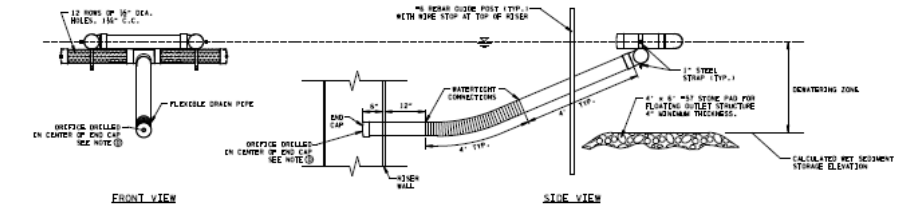
NOTE: THE CRITERION FOR SIZING THE CYLINDER IS THAT THE AREA BETWEEN THE INSIDE OF THE CYLINDER AND THE OUTSIDE OF THE RISER IS EQUAL TO OR GREATER THAN THE AREA INSIDE THE RISER. THEREFORE, THE ABOVE TABLE IS INVALID FOR USE WITH CONCRETE PIPE RISERS.
NOTE: CORRUGATION FOR 12" THRU 36" PIPE MEASURE 2.67" X 0.5"; FOR 42" THRU 84" THE CORRUGATION MEASURES 5" X 1" OR 3" X 1".
NOTE: C = CORRUGATED; F = FLAT.
ANTI-VORTEX DEVICE DETAIL
SECTION A - A
ISOMETRIC VIEW
TYPICAL FOR CONCRETE BASE
TYPICAL FOR STEEL BASE
TYPICAL ANTI-FLOTATION BLOCK DETAILS FOR RISERS TEN FEET OR LESS IN HEIGHT
NOTE: THE BASE OF THE PRINCIPAL SPILLWAY MUST BE FIRMLY ANCHORED TO PREVENT ITS FLOATING. IF THE RISER OF THE SPILLWAY IS GREATER THAN 10 FEET IN HEIGHT, COMPUTATIONS MUST BE MADE TO DETERMINE THE ANCHORING REQUIREMENTS. A MINIMUM FACTOR OF 1.25 SHALL BE USED (DOWNWARD FORCES = 1.25 X UPWARD FORCES).

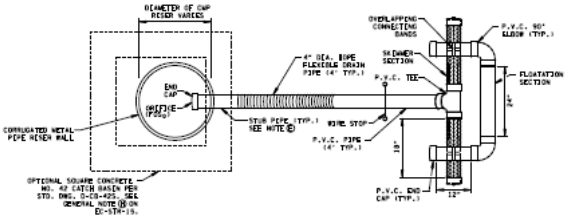
ANTI - SEEP COLLAR DIAPHRAGM DIMENSION TABLE

DIA (IN)	GAUGE	MINIMUM DIAPHRAGM SIZE (IN)	FABRICATION DIM. FOR ½ DIAPHRAGM (INCH) W (WIDTH)	H (HEIGHT)
8	16	58 X 58	58.5	30.5
10	16	58 X 58	58.5	30.5
12	16	60 X 60	64	32.5
15	16	63 X 63	66	34
18	16	66 X 66	69.25	35.5
21	16	69 X 69	72	37
24	14	72 X 72	72	38.5
30	14	78 X 78	82.5	41.5
36	14	84 X 84	88	44.5
42	14	90 X 90	93.25	47.5
48	14	96 X 96	96	50.5
54	14	102 X 102	101.25	53.5

ANTI-SEEP COLLAR DETAIL ASSEMBLY NOTES
ANTI-SEEP COLLAR GENERAL NOTES
SEDIMENT BASIN GENERAL NOTES
① TOP OF STONE PAD SHALL BE AT SAME ELEVATION AS THE TOP OF THE WET SEDIMENT STORAGE AREA.
② WHERE ACCEPTABLE, THE SQUARE CONCRETE NO. 42 CATCH BASIN WITH GRATE UNIT NO. 42 MAY BE USED IN LIEU OF USING ROUND PIPE FOR THE RISER.
③ WITH CONCRETE RISER, USE PVC SCHEDULE 40 STUB GROUTED TO CREATE A WATERTIGHT SEAL
④ DRAINAGE TUBING SHALL COMPLY WITH ASTM F667 AND AASHTO M294
DEWATERING SYSTEM DETAIL FOR SEDIMENT BASIN
SIDE VIEW OF ANTI-SEEP COLLAR
PLAN VIEW OF ANTI- SEEP COLLAR
NOTE: UPPER ONE HALF DIAPHRAGM SHOWN. OTHER HALF SAME EXCEPT SLOTS ARE VERTICAL
ANTI-SEEP COLLAR DETAIL
NOT TO SCALE
SEDIMENT BASIN RISER AND COLLAR APPURTENANCES
10-26-92
EC-STR-16


EXAMPLE PLAN VIEWS OF BAFFLE LOCATIONS IN SEDIMENT BASINS
L=TOTAL TRAVEL DISTANCE FROM THE POINT OF INFLOW AROUND THE BAFFLE TO THE RISER
SHAPE NO.1
SHAPE NO.2
SHAPE NO.3
L1 = L2
EMBANKMENT WITH EMERGENCY SPILLWAY
SECTION A-A
EMBANKMENT WITHOUT EMERGENCY SPILLWAY
(TEMPORARY ONLY)
(TO BE USED FOR SMALL SEDIMENT VOLUMES ONLY)
BAFFLE DETAIL
SEDIMENT BASIN GENERAL NOTES
Ⓐ BAFFLES SHALL BE 4 FEET X 8 FEET X ¾ INCH EXTERIOR PLYWOOD, TYPE "PLYFORM" GRADE BB, O, AND ES.
Ⓑ FOR EARTH-FILL EMBANKMENTS, A CUT-OFF TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE DAM. THE TRENCH MUST EXTEND AT LEAST ONE (1) FOOT INTO A STABLE, IMPERVIOUS LAYER OF SOIL AND HAVE A MINIMUM DEPTH OF TWO (2) FEET. THE MINIMUM BOTTOM WIDTH SHALL BE 4 FEET, BUT ALSO MUST BE WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 1:1.
Ⓒ THE EXPOSED SLOPES OF THE SEDIMENT BASIN SHOULD BE STABILIZED WITH TEMPORARY SEEDING WITH MULCH OR OTHER STABILIZATION METHODS.
Ⓓ SEDIMENT BASINS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:
203-01 ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED) PER CUBIC YARD
209-05 SEDIMENT REMOVAL PER CUBIC YARD
209-11.01 THRU 209-11.09 SEDIMENT BASIN RISER (_ _") PER EACH
209-11.20 SEDIMENT BASIN BAFFLES PER LINEAR FOOT
209-20.21 SEDIMENT BASIN OUTLET STRUCTURE (DESCRIPTION) PER LS
607-37.02 THRU 607-37.13 _ _" CORRUGATED METAL PIPE CULVERT PER LINEAR FOOT
709-05.06 MACHINED RIP-RAP (CLASS A-1) PER TON
709-05.08 MACHINED RIP-RAP (CLASS B) PER TON
740-10.03 GEOTEXTILE (TYPE III) (EROSION CONTROL) PER SQUARE YARD
801-01.07 TEMPORARY SEEDING (WITH MULCH) PER UNIT
Ⓔ PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE SEDIMENT BASIN.
SEE STANDARD DRAWINGS EC-STR-15, EC-STR-16 AND EC-STR-18 FOR ADDITIONAL DETAILS AND GENERAL NOTES NOT SHOWN ON THIS DRAWING.
NOT TO SCALE
SEDIMENT BASIN EMBANKMENT DETAILS
10-26-92
EC-STR-17
EROSION CONTROL PLAN LEGEND: SEDIMENT BASIN





FLOATING OUTLET STRUCTURE

ORIFICE SIZE, $FOS_{\#}$ (IN.)	DISCHARGE, Q (FT³/SEC)	EQUATIONS FOR MINIMUM AND MAXIMUM ORIFICE SIZE
1"	0.018	
1.5"	0.041	DEWATERING ZONE VOLUME (FT³) / Q_{MAX} = 259200
2"	0.074	
2.5"	0.116	
3"	0.167	DEWATERING ZONE VOLUME (FT³) / Q_{MIN} = 604800
3.5"	0.227	
4"	0.297	

PROCEDURE FOR ORIFICE SELECTION

1. KNOWING THE SIZE AND SHAPE OF THE DEWATERING ZONE, CALCULATE THE VOLUME OF WATER (CUBIC FEET) FROM THE BOTTOM OF THE DEWATERING ZONE TO THE TOP OF THE DEWATERING ZONE.
2. SOLVE FOR Q_{MIN} AND Q_{MAX} BASED ON THE VOLUME OF THE DEWATERING ZONE.
3. SELECT AN ORIFICE SIZE ($FOS_{\#}$) THAT HAS A CORRESPONDING DISCHARGE BETWEEN Q_{MAX} AND Q_{MIN}.

FLOATING OUTLET STRUCTURE GENERAL NOTES

(A) ALL P.V.C. PIPES ARE TO BE 4" I.D. SCHEDULE 40.

(B) ALL JOINTS OF THE FLOATATION SECTION SHALL BE SOLVENT WELDED TO ENSURE AN AIRTIGHT ASSEMBLY. CONTRACTOR TO CONDUCT A TEST TO CHECK FOR LEAKS PRIOR TO INSTALLATION. JOINTS OF THE SEDIMENT SECTION NEED NOT BE WATER-TIGHT.

(C) 4" HOPE FLEXIBLE DRAIN PIPE IS TO BE ATTACHED TO THE BASIN OUTLET STRUCTURE WITH WATER-TIGHT CONNECTIONS.

(D) ORIFICE IS TO BE SIZED ACCORDINGLY TO STORAGE VOLUME AND TO SLOWLY RELEASE RUNOFF. THE BASIN DEWATERING TIME SHOULD BE NO LESS THAN 3 DAYS.

(E) FOR CORRUGATED METAL RISER, STUB PIPE SHALL BE SCHEDULE 40 STEEL PIPE TACK WELDED TO CREATE A WATERTIGHT SEAL. FOR CONCRETE RISER, STUB PIPE SHALL BE SCHEDULE 40 P.V.C. PIPE GROUTED TO CREATE A WATERTIGHT SEAL.

(F) MATERIALS:

SOLID PIPE - 4" SCHEDULE 40 P.V.C.
PERFORATED PIPE - 4" SCHEDULE 40 P.V.C.
90° TEE (1 EA.) - 4" SCHEDULE 40 P.V.C.
90° ELBOW (2 EA.) 4" SCHEDULE 40 P.V.C.
CAP (4 EA.) - 4" SCHEDULE 40 P.V.C., SOLID
FLEXIBLE PIPE - 4" CORRUGATED HOPE (NON-PERFORATED)
MINERAL AGGREGATE - 1½E M47

(G) FLOATING OUTLET STRUCTURE SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-20.2) SEDIMENT BASIN OUTLET STRUCTURE (DESCRIPTION) L.S.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE FLOATING OUTLET STRUCTURE, INCLUDING REPLACEMENT OF THE STONE PAD AS NECESSARY.

(H) SEE THE DPL FOR APPROVED ALTERNATE FLOATING OUTLET STRUCTURES. THE ORIFICE SIZING PROCEDURE ON THIS SHEET IS NOT VALID FOR ALTERNATE FLOATING OUTLET STRUCTURES. ALTERNATE FLOATING OUTLET STRUCTURES SHALL BE DESIGNED TO ACHIEVE A SIMILAR DEWATERING TIME.

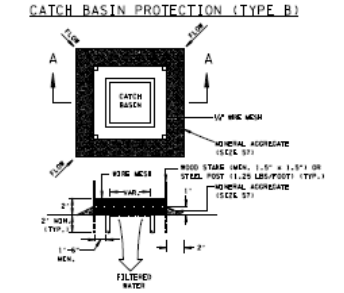
(I) SEE STANDARD DRAWINGS EC-STR-15, EC-STR-16 AND EC-STR-17 FOR ADDITIONAL DETAILS AND GENERAL NOTES NOT SHOWN ON THIS DRAWING.

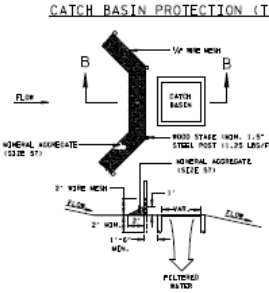
NOT TO SCALE

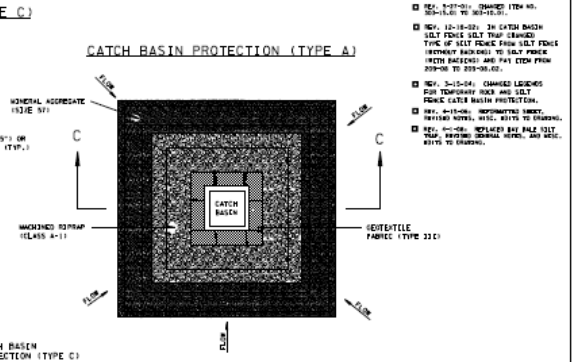
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION

SEDIMENT BASIN FLOATING OUTLET STRUCTURE

8-01-12 EC-STR-18







REV. 12-8-95, CHANGED DRAWING NO. FROM EC-STR-19 TO EC-STR-19.

REV. 9-27-01: CHANGED ITEM NO. 209-15.01 TO 209-15.01.

REV. 12-16-02: IN CATCH BASIN SILT FENCE SILT TRAP (BACK) TYPE OF SILT FENCE FROM SILT FENCE (WITHOUT BACKING) TO SILT FENCE (WITH BACKING) AND PAY ITEM FROM 209-00 TO 209-00.02.

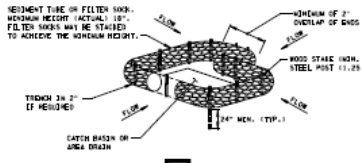
REV. 3-15-04: CHANGED LEGENDS FOR TEMPORARY ROCK AND SILT FENCE CATCH BASIN PROTECTION.

REV. 6-15-06: REFORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING.

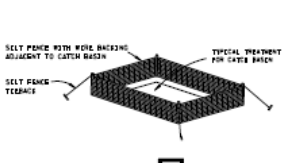
REV. 6-1-09: REPLACED HAY BALE SILT TRAP, REVISED GENERAL NOTES, AND MISC. EDITS TO DRAWING.

EROSION CONTROL PLAN LEGEND: (B) CATCH BASIN PROTECTION (TYPE B)

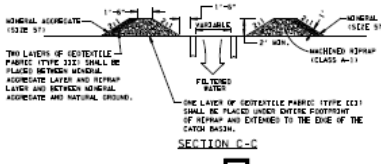
EROSION CONTROL PLAN LEGEND: (C) CATCH BASIN PROTECTION (TYPE C)



EROSION CONTROL PLAN LEGEND: (D) CATCH BASIN PROTECTION (TYPE D)



EROSION CONTROL PLAN LEGEND: (E) CATCH BASIN PROTECTION (TYPE E)



EROSION CONTROL PLAN LEGEND: (A) CATCH BASIN PROTECTION (TYPE A)

CATCH BASIN PROTECTION GENERAL NOTES

(A) CATCH BASIN PROTECTION IS USED TO PREVENT SEDIMENT IN CONSTRUCTION SITE RUNOFF FROM ENTERING A STORM SEWER SYSTEM.

(B) TYPE B, TYPE C, TYPE D (SEDIMENT TUBE), AND TYPE E SHOULD ONLY BE USED IN UNPAVED AREAS. TYPE A AND TYPE D (FILTER SOCK) MAY BE USED IN BOTH UNPAVED AND PAVED AREAS.

(C) TYPE B, TYPE C, TYPE D, AND TYPE E HAVE A MAXIMUM DRAINAGE AREA OF 1 ACRE. TYPE A HAS A MAXIMUM DRAINAGE AREA OF 3 ACRES.

(D) ONLY GEOTEXTILE FABRIC (TYPE 33) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(E) THE WIRE MESH USED IN TYPE B AND TYPE C SHALL BE A MINIMUM 19 GAGE HARDWARE CLOTH WITH ½" INCH MESH OPENINGS.

(F) FOR INSTALLATION DETAILS FOR SILT FENCE WITH WIRE BACKING (EC-STR-3C), FILTER SOCK (EC-STR-8), AND SEDIMENT TUBE (EC-STR-3F) REFER TO THEIR RESPECTIVE STANDARD DRAWING. FILTER SOCKS MAY NOT REQUIRE STAKING WHEN APPROVED BY THE ENGINEER.

(G) ANY PRODUCT LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE IS ALSO ACCEPTABLE.

(H) CATCH BASIN PROTECTION SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-40.30	CATCH BASIN PROTECTION (TYPE A) PER EACH
209-40.31	CATCH BASIN PROTECTION (TYPE B) PER EACH
209-40.32	CATCH BASIN PROTECTION (TYPE C) PER EACH
209-40.33	CATCH BASIN PROTECTION (TYPE D) PER EACH
209-40.34	CATCH BASIN PROTECTION (TYPE E) PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF CATCH BASIN PROTECTION.

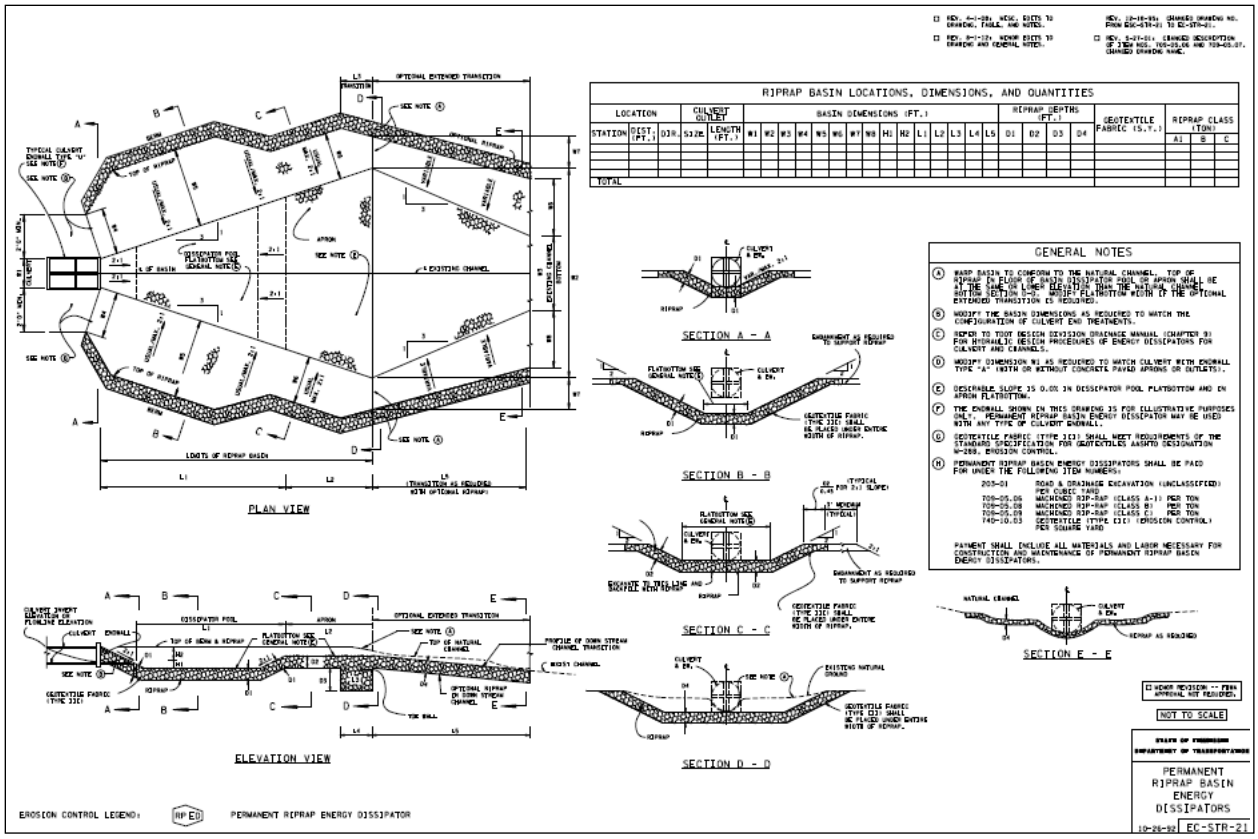
(I) SEDIMENT SHALL BE REMOVED FROM BEHIND THE CATCH BASIN PROTECTION WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL, PER CUBIC YARD.

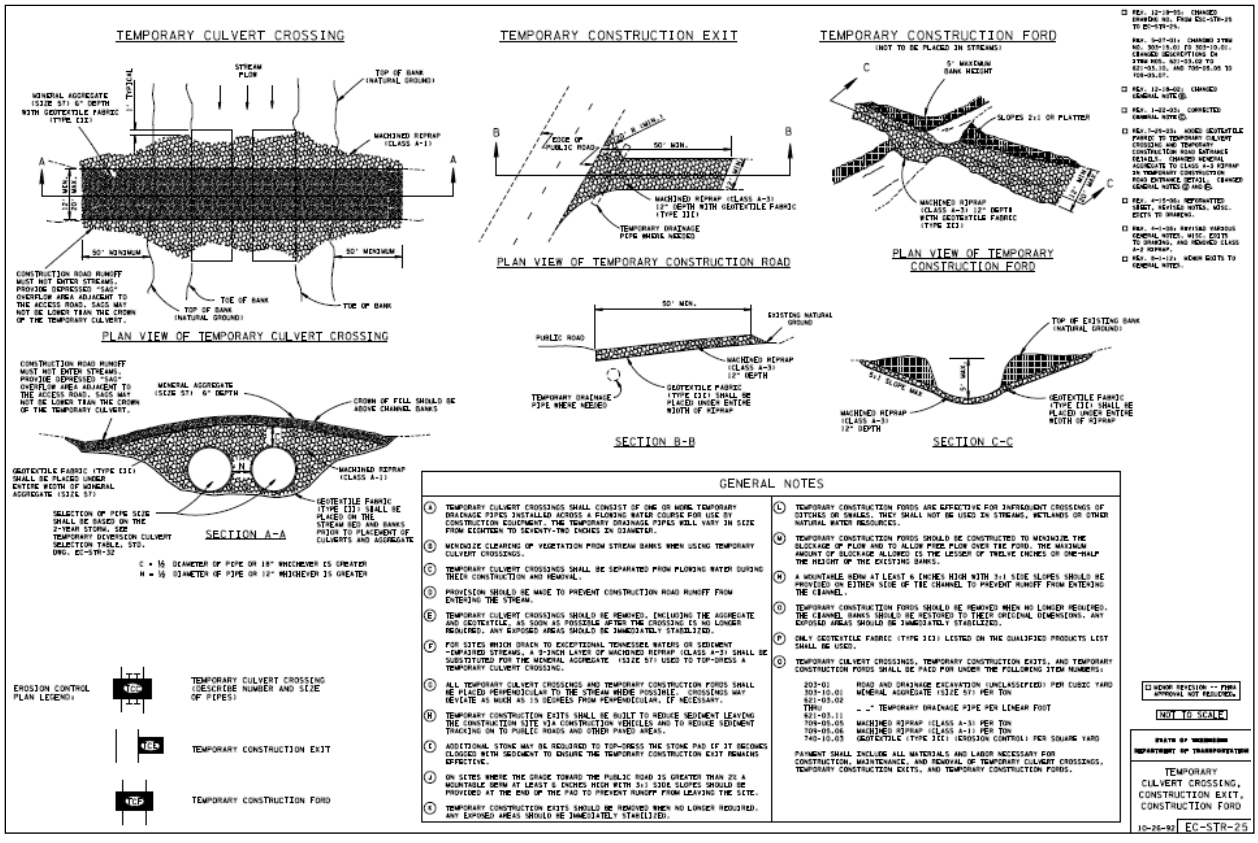
MINOR REVISION — ITEM APPROVAL NOT REQUIRED

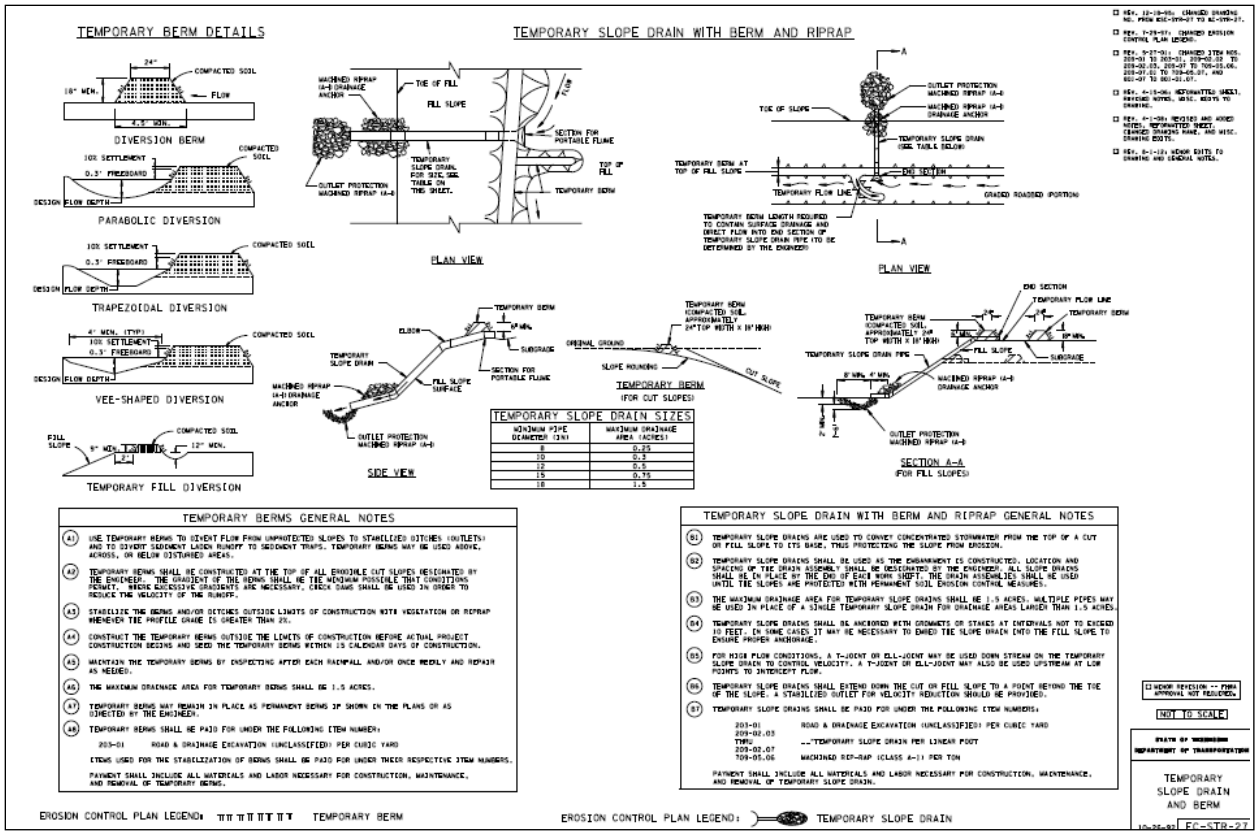
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION

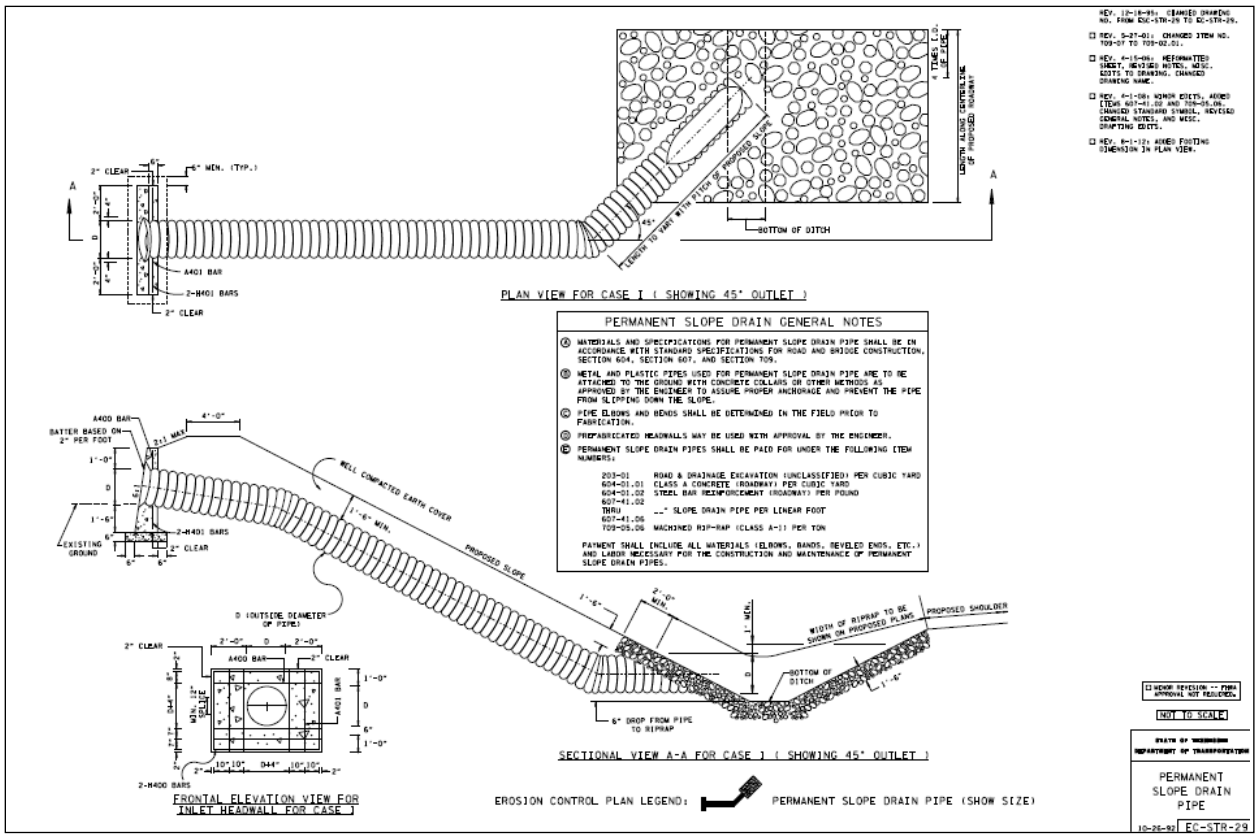
CATCH BASIN PROTECTION

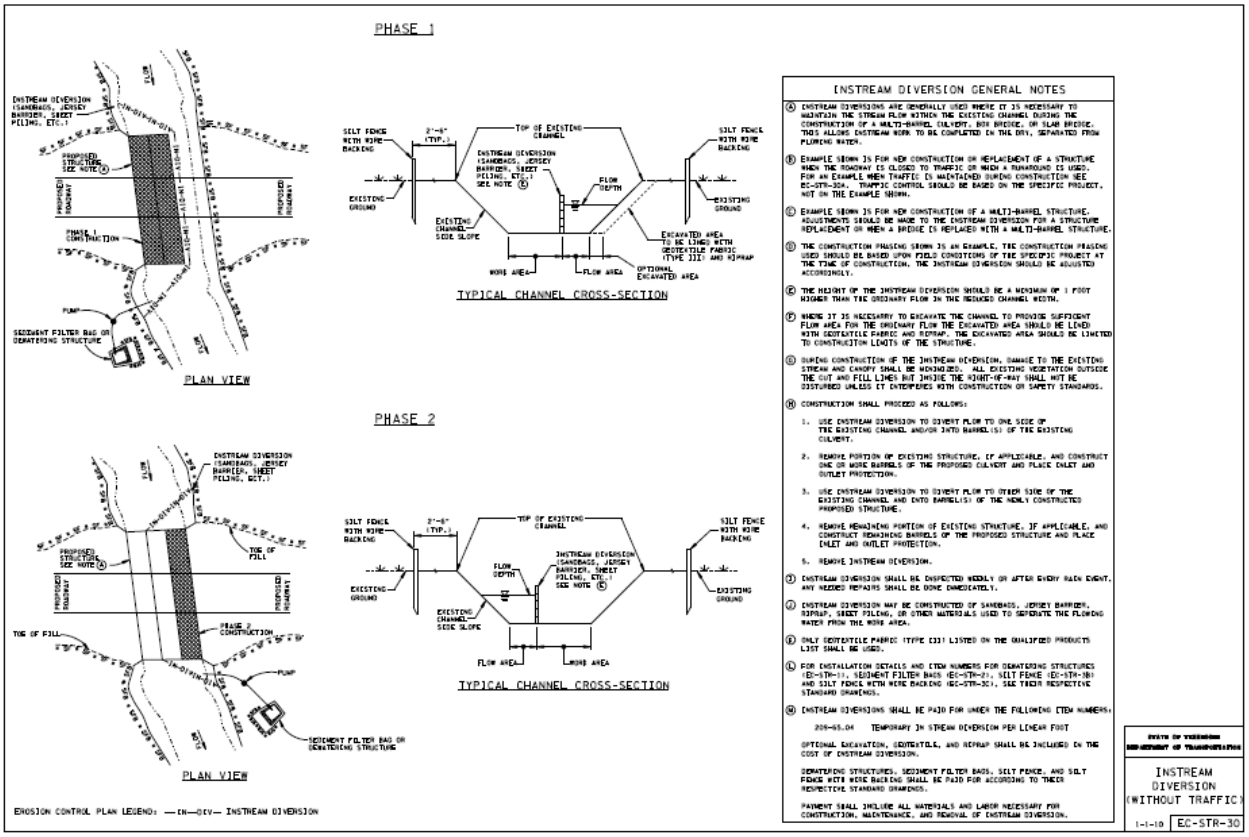
10-26-92 EC-STR-19


RIPRAP BASIN LOCATIONS, DIMENSIONS, AND QUANTITIES
LOCATION
CULVERT OUTLET
BASIN DIMENSIONS (FT.)
RIPRAP DEPTHS (FT.)
GEOTEXTILE FABRIC (S.Y.)
RIPRAP CLASS (TON)
STATION
DIST. (FT.)
DIR.
SIZE
LENGTH (FT.)
W1 W2 W3 W4 W5 W6 W7 W8 H1 H2 L1 L2 L3 L4 L5
D1 D2 D3 D4
A1 B C
TOTAL
GENERAL NOTES
PLAN VIEW
ELEVATION VIEW
SECTION A - A
SECTION B - B
SECTION C - C
SECTION D - D
SECTION E - E
NOT TO SCALE
PERMANENT RIPRAP BASIN ENERGY DISSIPATORS
EC-STR-21


TEMPORARY CULVERT CROSSING
TEMPORARY CONSTRUCTION EXIT
TEMPORARY CONSTRUCTION FORD
PLAN VIEW OF TEMPORARY CULVERT CROSSING
PLAN VIEW OF TEMPORARY CONSTRUCTION ROAD
PLAN VIEW OF TEMPORARY CONSTRUCTION FORD
SECTION A-A
SECTION B-B
SECTION C-C
GENERAL NOTES
EROSION CONTROL PLAN LEGEND:
TEMPORARY CULVERT CROSSING (DESCRIBE NUMBER AND SIZE OF PIPES)
TEMPORARY CONSTRUCTION EXIT
TEMPORARY CONSTRUCTION FORD
NOT TO SCALE
TEMPORARY CULVERT CROSSING, CONSTRUCTION EXIT, CONSTRUCTION FORD
EC-STR-25


TEMPORARY BERM DETAILS
DIVERSION BERM
PARABOLIC DIVERSION
TRAPEZOIDAL DIVERSION
VEE-SHAPED DIVERSION
TEMPORARY FILL DIVERSION
TEMPORARY SLOPE DRAIN WITH BERM AND RIPRAP
PLAN VIEW
SIDE VIEW
TEMPORARY BERM
(FOR CUT SLOPES)
SECTION A-A
(FOR FILL SLOPES)
TEMPORARY SLOPE DRAIN SIZES
MAXIMUM PIPE DIAMETER (IN)
MAXIMUM DRAINAGE AREA (ACRES)
8 0.25
10 0.3
12 0.5
15 0.75
18 1.5
TEMPORARY BERMS GENERAL NOTES
TEMPORARY SLOPE DRAIN WITH BERM AND RIPRAP GENERAL NOTES
EROSION CONTROL PLAN LEGEND: TEMPORARY BERM
EROSION CONTROL PLAN LEGEND: TEMPORARY SLOPE DRAIN
NOT TO SCALE
TEMPORARY SLOPE DRAIN AND BERM
10-26-92 EC-STR-27


PLAN VIEW FOR CASE I (SHOWING 45° OUTLET)
PERMANENT SLOPE DRAIN GENERAL NOTES
SECTIONAL VIEW A-A FOR CASE I (SHOWING 45° OUTLET)
FRONTAL ELEVATION VIEW FOR INLET HEADWALL FOR CASE I
EROSION CONTROL PLAN LEGEND: PERMANENT SLOPE DRAIN PIPE (SHOW SIZE)
NOT TO SCALE
PERMANENT SLOPE DRAIN PIPE
10-26-92 EC-STR-29



INSTREAM DIVERSION GENERAL NOTES

(A) INSTREAM DIVERSIONS ARE GENERALLY USED WHERE IT IS NECESSARY TO MAINTAIN THE STREAM FLOW WITHIN THE EXISTING CHANNEL DURING THE CONSTRUCTION OF A MULTI-BARREL CULVERT, BOX BRIDGE, OR SLAB BRIDGE. THIS ALLOWS INSTREAM WORK TO BE COMPLETED IN THE DRY, SEPARATED FROM FLOWING WATER.

(B) EXAMPLE SHOWN IS FOR NEW CONSTRUCTION OR REPLACEMENT OF A STRUCTURE WHEN THE ROADWAY IS CLOSED TO TRAFFIC OR WHEN A RUNAROUND IS USED. FOR AN EXAMPLE WHEN TRAFFIC IS MAINTAINED DURING CONSTRUCTION SEE EC-STR-30A. TRAFFIC CONTROL SHOULD BE BASED ON THE SPECIFIC PROJECT, NOT ON THE EXAMPLE SHOWN.

(C) EXAMPLE SHOWN IS FOR NEW CONSTRUCTION OF A MULTI-BARREL STRUCTURE. ADJUSTMENTS SHOULD BE MADE TO THE INSTREAM DIVERSION FOR A STRUCTURE REPLACEMENT OR WHEN A BRIDGE IS REPLACED WITH A MULTI-BARREL STRUCTURE.

(D) THE CONSTRUCTION PHASING SHOWN IS AN EXAMPLE. THE CONSTRUCTION PHASING USED SHOULD BE BASED UPON FIELD CONDITIONS OF THE SPECIFIC PROJECT AT THE TIME OF CONSTRUCTION. THE INSTREAM DIVERSION SHOULD BE ADJUSTED ACCORDINGLY.

(E) THE HEIGHT OF THE INSTREAM DIVERSION SHOULD BE A MINIMUM OF 1 FOOT HIGHER THAN THE ORDINARY FLOW IN THE REDUCED CHANNEL WIDTH.

(F) WHERE IT IS NECESSARY TO EXCAVATE THE CHANNEL TO PROVIDE SUFFICIENT FLOW AREA FOR THE ORDINARY FLOW THE EXCAVATED AREA SHALL BE LINED WITH GEOTEXTILE FABRIC AND RIPRAP. THE EXCAVATED AREA SHALL BE LIMITED TO CONSTRUCTION LIMITS OF THE STRUCTURE.

(G) DURING CONSTRUCTION OF THE INSTREAM DIVERSION, DAMAGE TO THE EXISTING STREAM AND CANOPY SHALL BE MINIMIZED. ALL EXISTING VEGETATION OUTSIDE THE CUT AND FILL LINES BUT INSIDE THE RIGHT-OF-WAY SHALL NOT BE DISTURBED UNLESS IT INTERFERES WITH CONSTRUCTION OR SAFETY STANDARDS.

(H) CONSTRUCTION SHALL PROCEED AS FOLLOWS:

1. USE INSTREAM DIVERSION TO DIVERT FLOW TO ONE SIDE OF THE EXISTING CHANNEL AND/OR INTO BARREL(S) OF THE EXISTING CULVERT.
2. REMOVE PORTION OF EXISTING STRUCTURE, IF APPLICABLE, AND CONSTRUCT ONE OR MORE BARRELS OF THE PROPOSED CULVERT AND PLACE INLET AND OUTLET PROTECTION.
3. USE INSTREAM DIVERSION TO DIVERT FLOW TO OTHER SIDE OF THE EXISTING CHANNEL AND INTO BARREL(S) OF THE NEWLY CONSTRUCTED PROPOSED STRUCTURE.
4. REMOVE REMAINING PORTION OF EXISTING STRUCTURE, IF APPLICABLE, AND CONSTRUCT REMAINING BARRELS OF THE PROPOSED STRUCTURE AND PLACE INLET AND OUTLET PROTECTION.
5. REMOVE INSTREAM DIVERSION.

(I) INSTREAM DIVERSION SHALL BE INSPECTED WEEKLY OR AFTER EVERY RAIN EVENT. ANY NEEDED REPAIRS SHALL BE DONE IMMEDIATELY.

(J) INSTREAM DIVERSION MAY BE CONSTRUCTED OF SANDBAGS, JERSEY BARRIER, RIPRAP, SHEET PILING, OR OTHER MATERIALS USED TO SEPERATE THE FLOWING WATER FROM THE WORK AREA.

(K) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(L) FOR INSTALLATION DETAILS AND ITEM NUMBERS FOR DEWATERING STRUCTURES (EC-STR-11), SEDIMENT FILTER BAGS (EC-STR-21), SILT FENCE (EC-STR-18) AND SILT FENCE WITH WIRE BACKING (EC-STR-3C), SEE THEIR RESPECTIVE STANDARD DRAWINGS.

(M) INSTREAM DIVERSIONS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

205-65.04 TEMPORARY IN STREAM DIVERSION PER LINEAR FOOT

OPTIONAL EXCAVATION, GEOTEXTILE, AND RIPRAP SHALL BE INCLUDED IN THE COST OF INSTREAM DIVERSION.

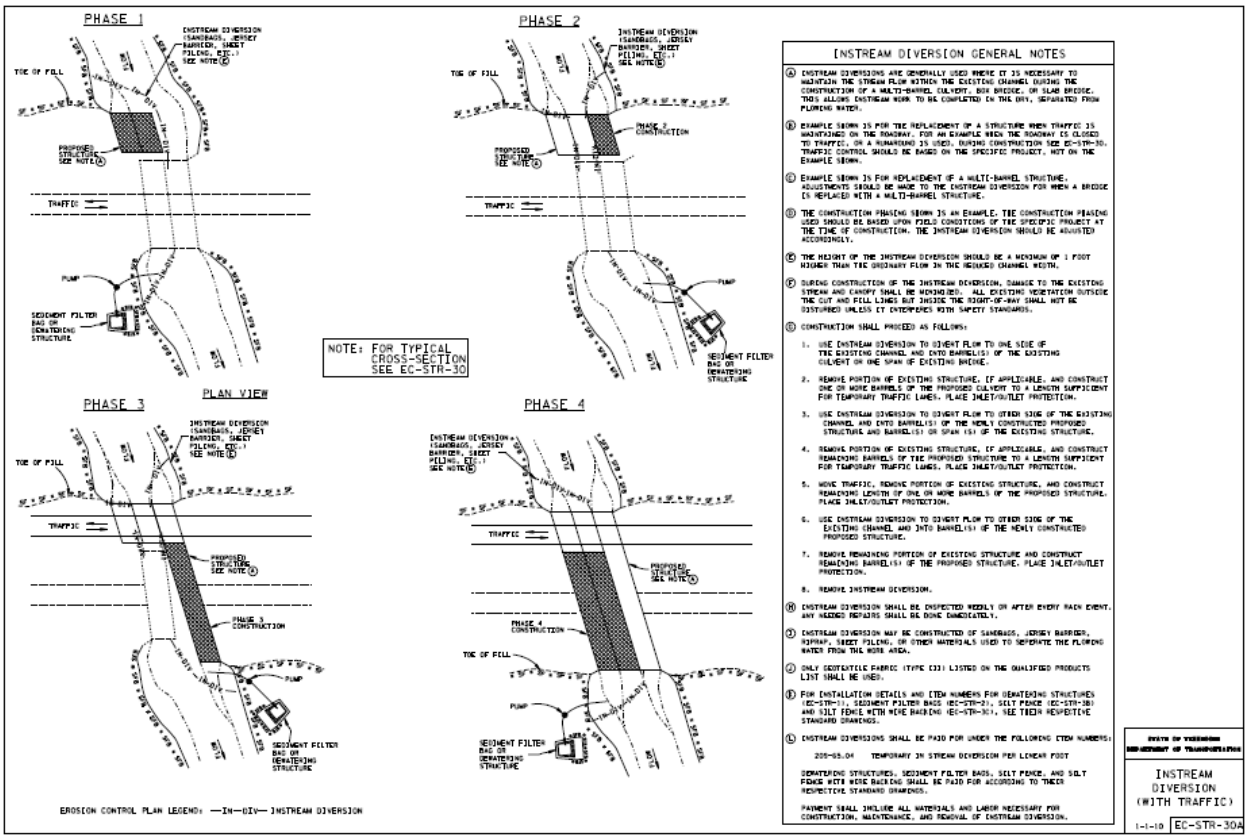
DEWATERING STRUCTURES, SEDIMENT FILTER BAGS, SILT FENCE, AND SILT FENCE WITH WIRE BACKING SHALL BE PAID FOR ACCORDING TO THEIR RESPECTIVE STANDARD DRAWINGS.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF INSTREAM DIVERSION.

STATE OF VERMONT AGENCY OF TRANSPORTATION

INSTREAM DIVERSION (WITHOUT TRAFFIC)

1-1-10 EC-STR-30



INSTREAM DIVERSION GENERAL NOTES

(A) INSTREAM DIVERSIONS ARE GENERALLY USED WHERE IT IS NECESSARY TO MAINTAIN THE STREAM FLOW WITHIN THE EXISTING CHANNEL DURING THE CONSTRUCTION OF A MULTI-BARREL CULVERT, BOX BRIDGE, OR SLAB BRIDGE. THIS ALLOWS INSTREAM WORK TO BE COMPLETED IN THE DRY, SEPARATED FROM FLOWING WATER.

(B) EXAMPLE SHOWN IS FOR THE REPLACEMENT OF A STRUCTURE WHEN TRAFFIC IS MAINTAINED ON THE ROADWAY. FOR AN EXAMPLE WHEN THE ROADWAY IS CLOSED TO TRAFFIC, OR A RUNAROUND IS USED, DURING CONSTRUCTION SEE EC-STR-30. TRAFFIC CONTROL SHOULD BE BASED ON THE SPECIFIC PROJECT, NOT ON THE EXAMPLE SHOWN.

(C) EXAMPLE SHOWN IS FOR REPLACEMENT OF A MULTI-BARREL STRUCTURE. ADJUSTMENTS SHOULD BE MADE TO THE INSTREAM DIVERSION FOR WHEN A BRIDGE IS REPLACED WITH A MULTI-BARREL STRUCTURE.

(D) THE CONSTRUCTION PHASING SHOWN IS AN EXAMPLE. THE CONSTRUCTION PHASING USED SHOULD BE BASED UPON FIELD CONDITIONS OF THE SPECIFIC PROJECT AT THE TIME OF CONSTRUCTION. THE INSTREAM DIVERSION SHOULD BE ADJUSTED ACCORDINGLY.

(E) THE HEIGHT OF THE INSTREAM DIVERSION SHOULD BE A MINIMUM OF 1 FOOT HIGHER THAN THE ORDINARY FLOW IN THE REDUCED CHANNEL WIDTH.

(F) DURING CONSTRUCTION OF THE INSTREAM DIVERSION, DAMAGE TO THE EXISTING STREAM AND CANOPY SHALL BE MINIMIZED. ALL EXISTING VEGETATION OUTSIDE THE CUT AND FILL LINES BUT INSIDE THE RIGHT-OF-WAY SHALL NOT BE DISTURBED UNLESS IT INTERFERES WITH SAFETY STANDARDS.

(G) CONSTRUCTION SHALL PROCEED AS FOLLOWS:

1. USE INSTREAM DIVERSION TO DIVERT FLOW TO ONE SIDE OF THE EXISTING CHANNEL AND INTO BARREL(S) OF THE EXISTING CULVERT OR ONE SPAN OF EXISTING BRIDGE.
2. REMOVE PORTION OF EXISTING STRUCTURE, IF APPLICABLE, AND CONSTRUCT ONE OR MORE BARRELS OF THE PROPOSED CULVERT TO A LENGTH SUFFICIENT FOR TEMPORARY TRAFFIC LANES. PLACE INLET/OUTLET PROTECTION.
3. USE INSTREAM DIVERSION TO DIVERT FLOW TO OTHER SIDE OF THE EXISTING CHANNEL AND INTO BARREL(S) OF THE NEWLY CONSTRUCTED PROPOSED STRUCTURE AND BARREL(S) OR SPAN (S) OF THE EXISTING STRUCTURE.
4. REMOVE PORTION OF EXISTING STRUCTURE, IF APPLICABLE, AND CONSTRUCT REMAINING BARRELS OF THE PROPOSED STRUCTURE TO A LENGTH SUFFICIENT FOR TEMPORARY TRAFFIC LANES. PLACE INLET/OUTLET PROTECTION.
5. MOVE TRAFFIC, REMOVE PORTION OF EXISTING STRUCTURE, AND CONSTRUCT REMAINING LENGTH OF ONE OR MORE BARRELS OF THE PROPOSED STRUCTURE. PLACE INLET/OUTLET PROTECTION.
6. USE INSTREAM DIVERSION TO DIVERT FLOW TO OTHER SIDE OF THE EXISTING CHANNEL AND INTO BARREL(S) OF THE NEWLY CONSTRUCTED PROPOSED STRUCTURE.
7. REMOVE REMAINING PORTION OF EXISTING STRUCTURE AND CONSTRUCT REMAINING BARREL(S) OF THE PROPOSED STRUCTURE. PLACE INLET/OUTLET PROTECTION.
8. REMOVE INSTREAM DIVERSION.

(H) INSTREAM DIVERSION SHALL BE INSPECTED WEEKLY OR AFTER EVERY RAIN EVENT. ANY NEEDED REPAIRS SHALL BE DONE IMMEDIATELY.

(J) INSTREAM DIVERSION MAY BE CONSTRUCTED OF SANDBAGS, JERSEY BARRIER, RIPRAP, SHEET PILING, OR OTHER MATERIALS USED TO SEPERATE THE FLOWING WATER FROM THE WORK AREA.

(J) ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.

(K) FOR INSTALLATION DETAILS AND ITEM NUMBERS FOR DEWATERING STRUCTURES (EC-STR-11), SEDIMENT FILTER BAGS (EC-STR-21), SILT FENCE (EC-STR-18) AND SILT FENCE WITH WIRE BACKING (EC-STR-3C), SEE THEIR RESPECTIVE STANDARD DRAWINGS.

(L) INSTREAM DIVERSIONS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

205-65.04 TEMPORARY IN STREAM DIVERSION PER LINEAR FOOT

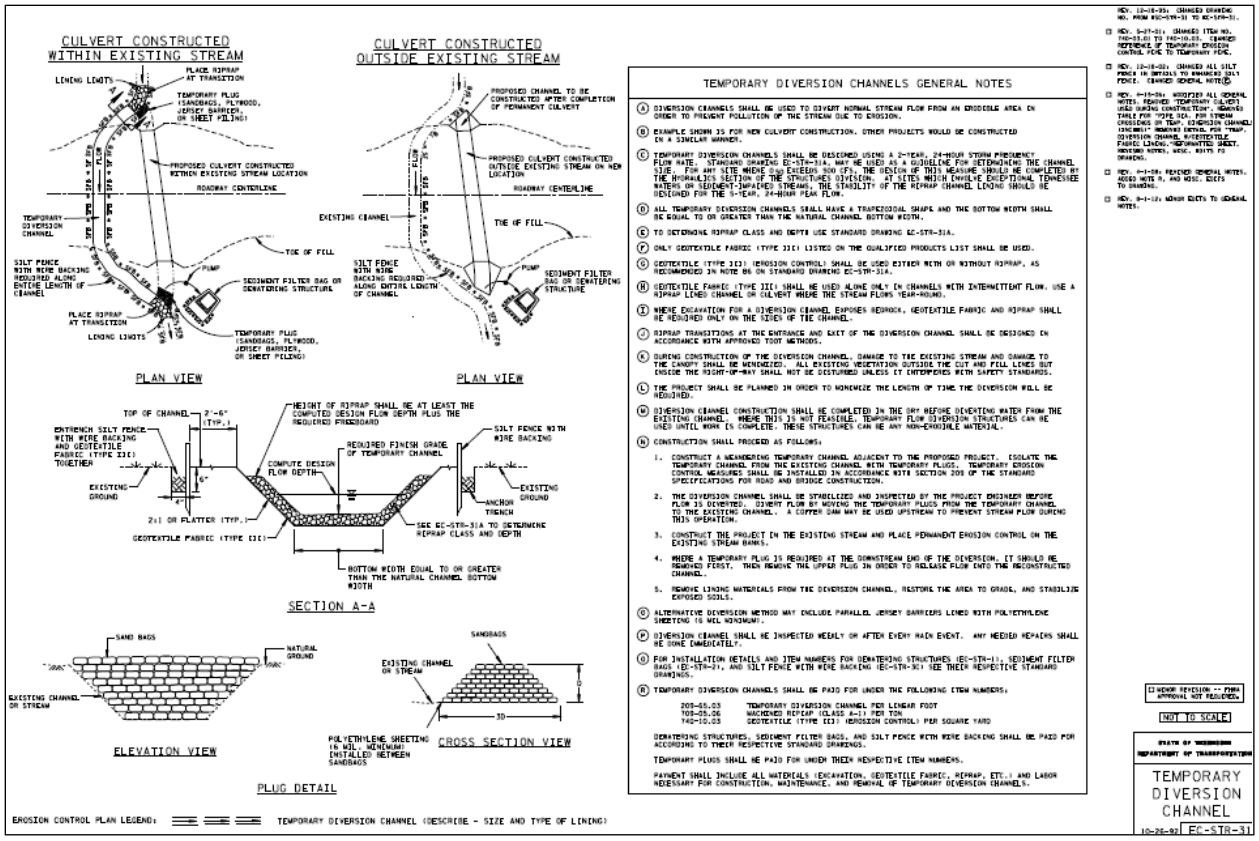
DEWATERING STRUCTURES, SEDIMENT FILTER BAGS, SILT FENCE, AND SILT FENCE WITH WIRE BACKING SHALL BE PAID FOR ACCORDING TO THEIR RESPECTIVE STANDARD DRAWINGS.

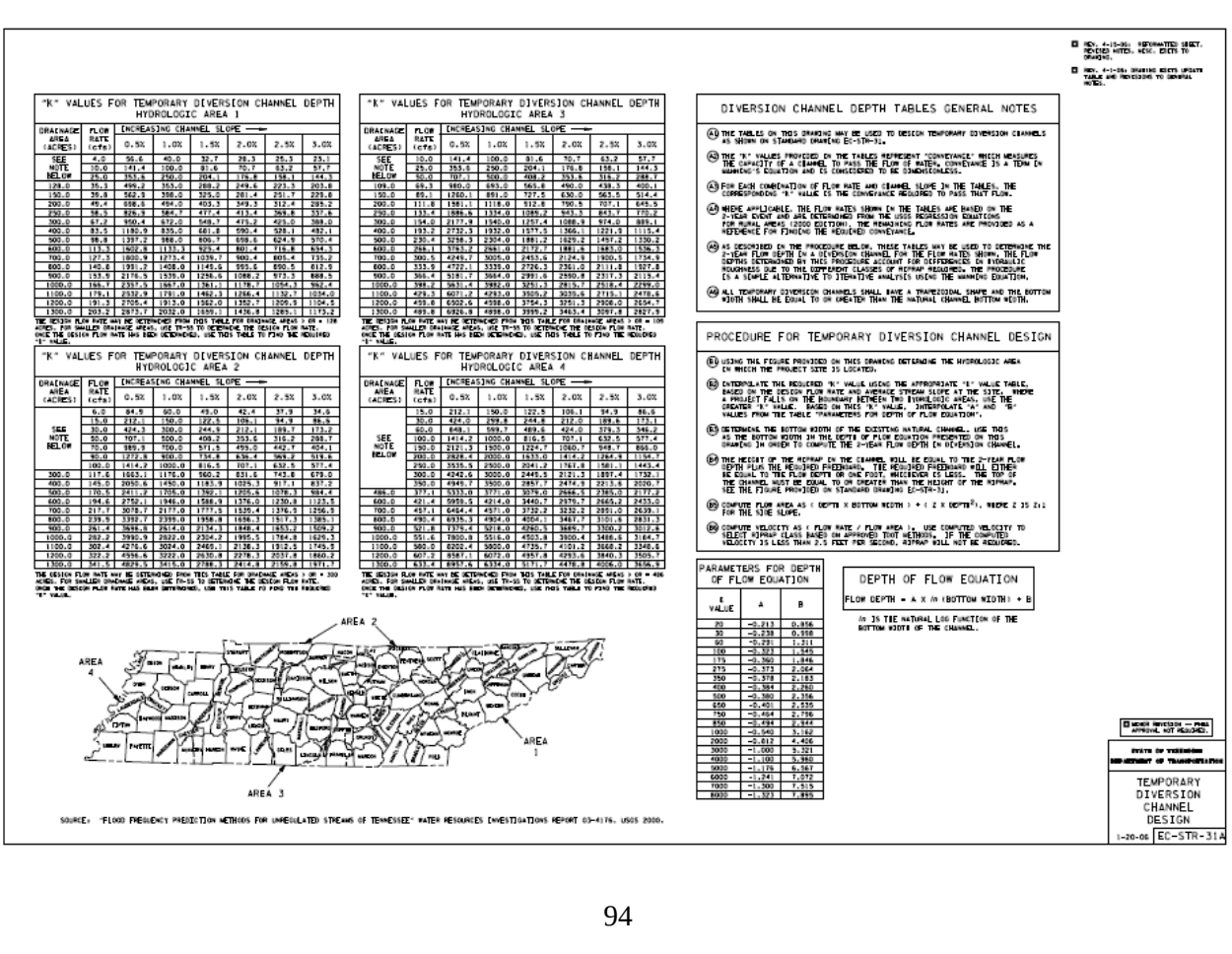
PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF INSTREAM DIVERSION.

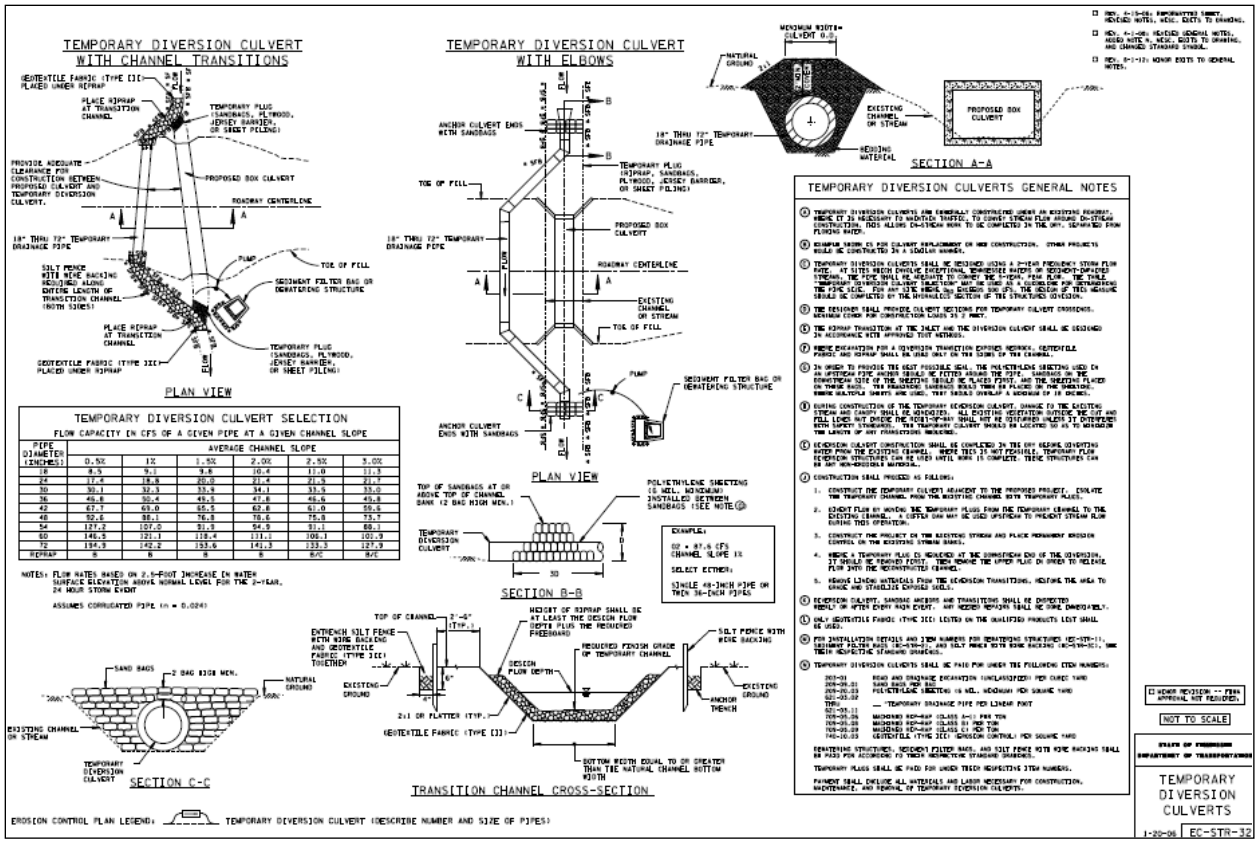
STATE OF VERMONT AGENCY OF TRANSPORTATION

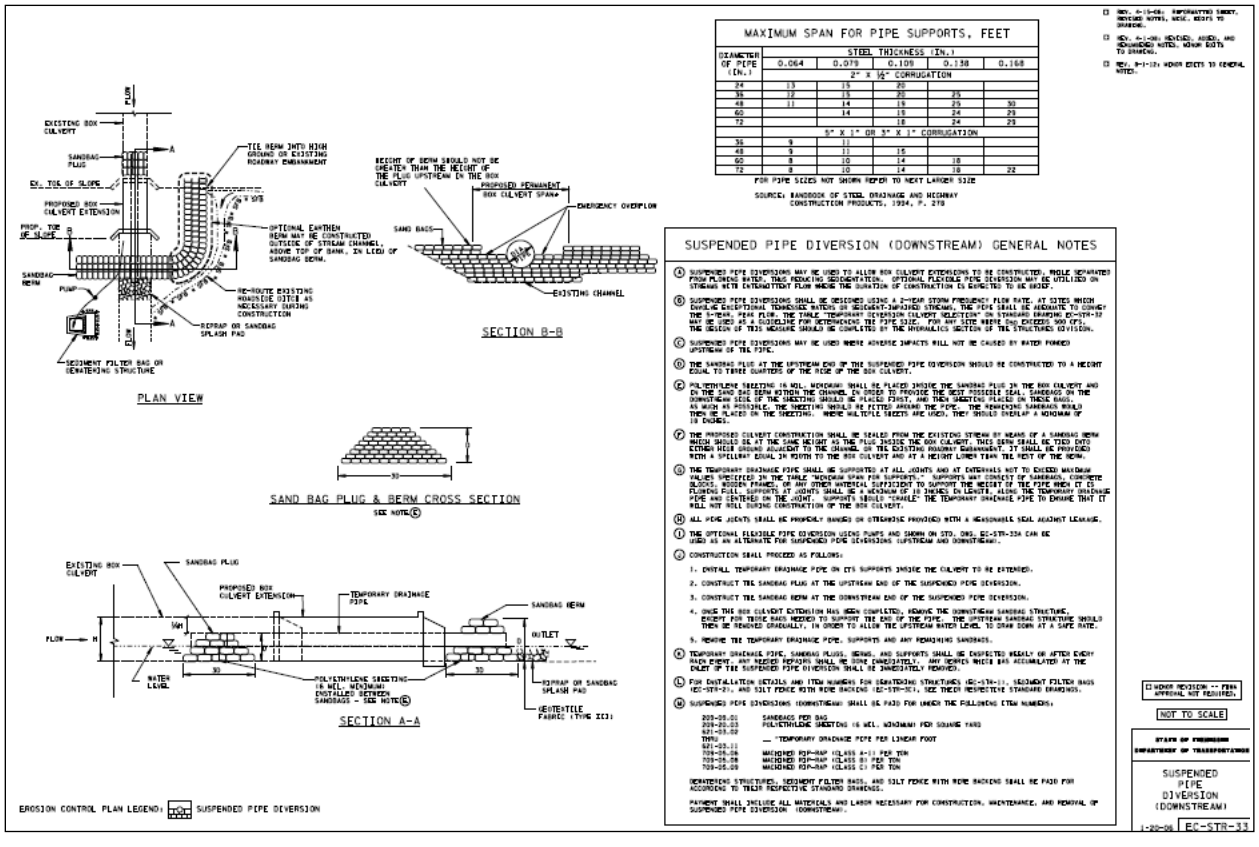
INSTREAM DIVERSION (WITH TRAFFIC)

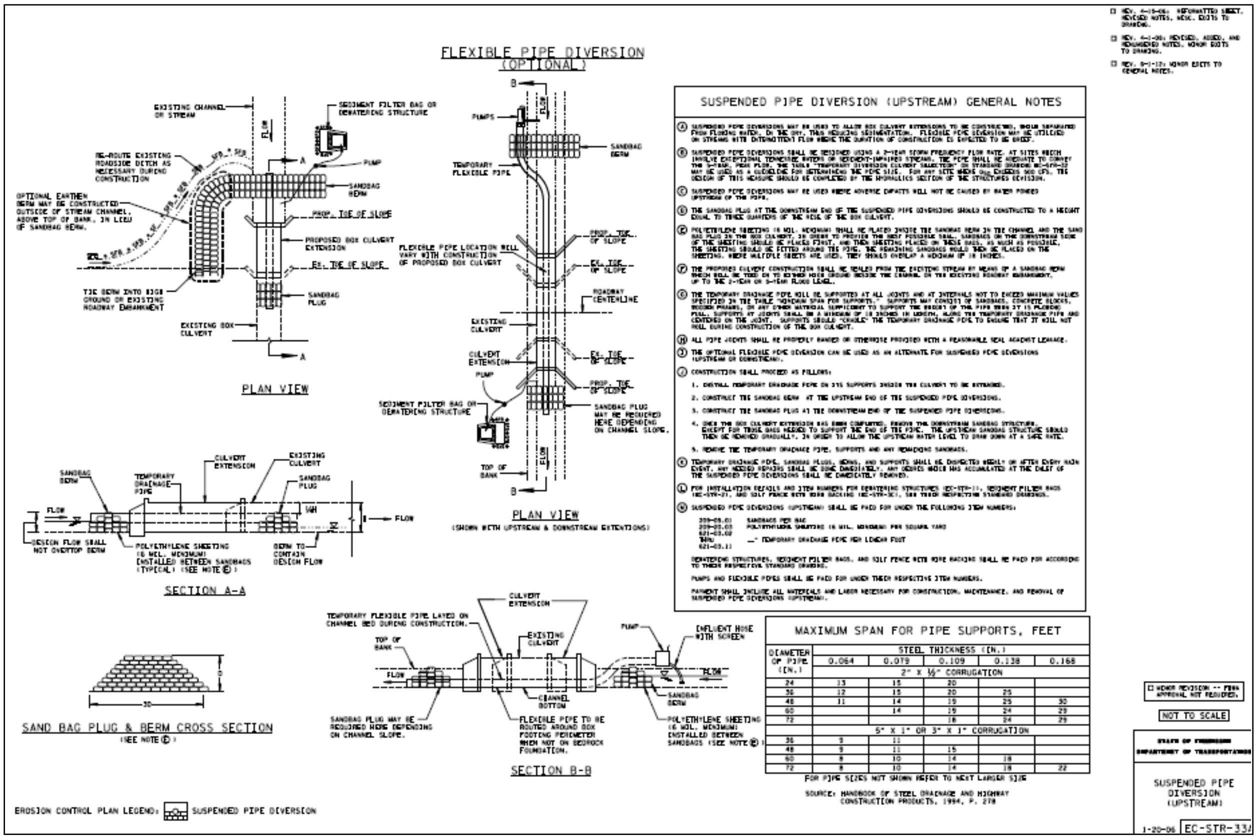
1-1-10 EC-STR-30A


CULVERT CONSTRUCTED WITHIN EXISTING STREAM
CULVERT CONSTRUCTED OUTSIDE EXISTING STREAM
PLAN VIEW
PLAN VIEW
SECTION A-A
ELEVATION VIEW
CROSS SECTION VIEW
PLUG DETAIL
TEMPORARY DIVERSION CHANNELS GENERAL NOTES
TEMPORARY DIVERSION CHANNEL
EC-STR-31

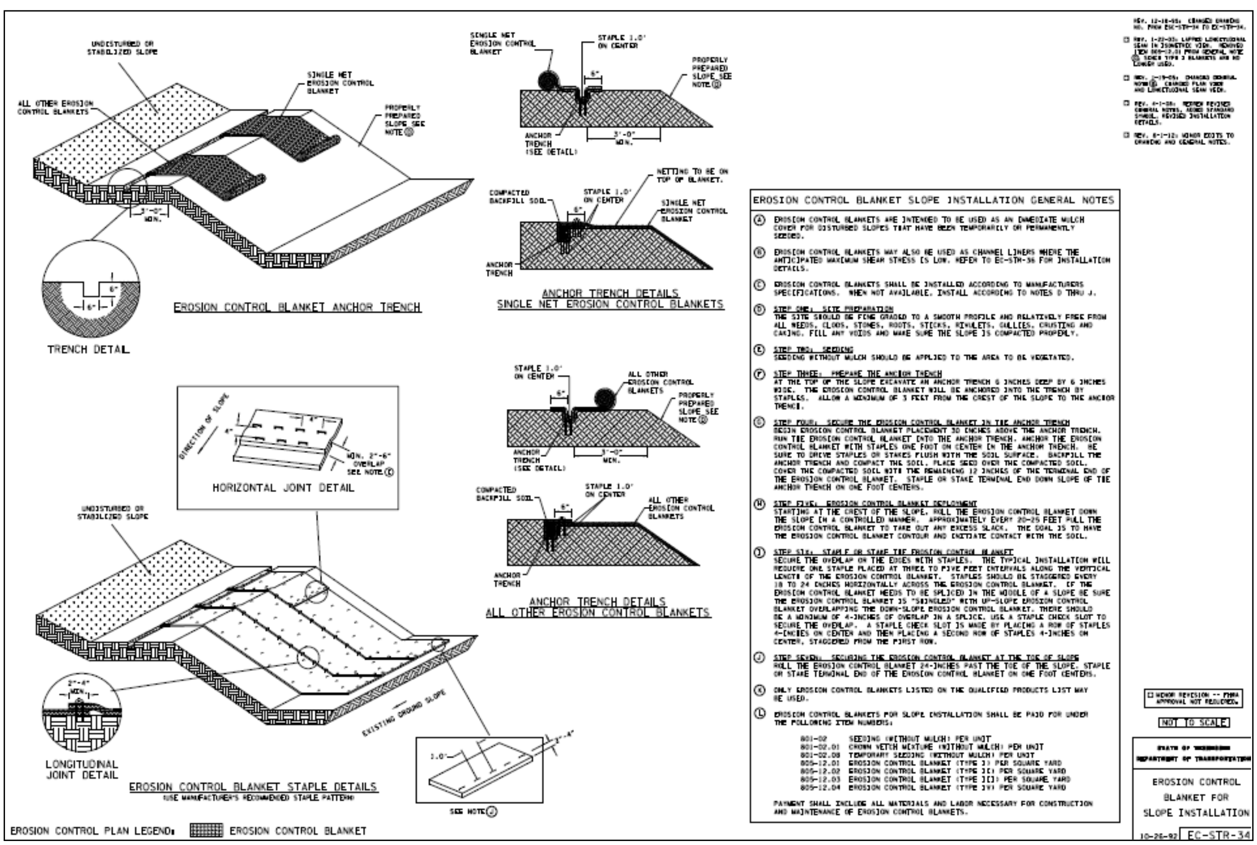

"K" VALUES FOR TEMPORARY DIVERSION CHANNEL DEPTH HYDROLOGIC AREA 1
"K" VALUES FOR TEMPORARY DIVERSION CHANNEL DEPTH HYDROLOGIC AREA 3
"K" VALUES FOR TEMPORARY DIVERSION CHANNEL DEPTH HYDROLOGIC AREA 2
"K" VALUES FOR TEMPORARY DIVERSION CHANNEL DEPTH HYDROLOGIC AREA 4
DIVERSION CHANNEL DEPTH TABLES GENERAL NOTES
PROCEDURE FOR TEMPORARY DIVERSION CHANNEL DESIGN
PARAMETERS FOR DEPTH OF FLOW EQUATION
DEPTH OF FLOW EQUATION
AREA 1
AREA 2
AREA 3
AREA 4
TEMPORARY DIVERSION CHANNEL DESIGN
EC-STR-31A

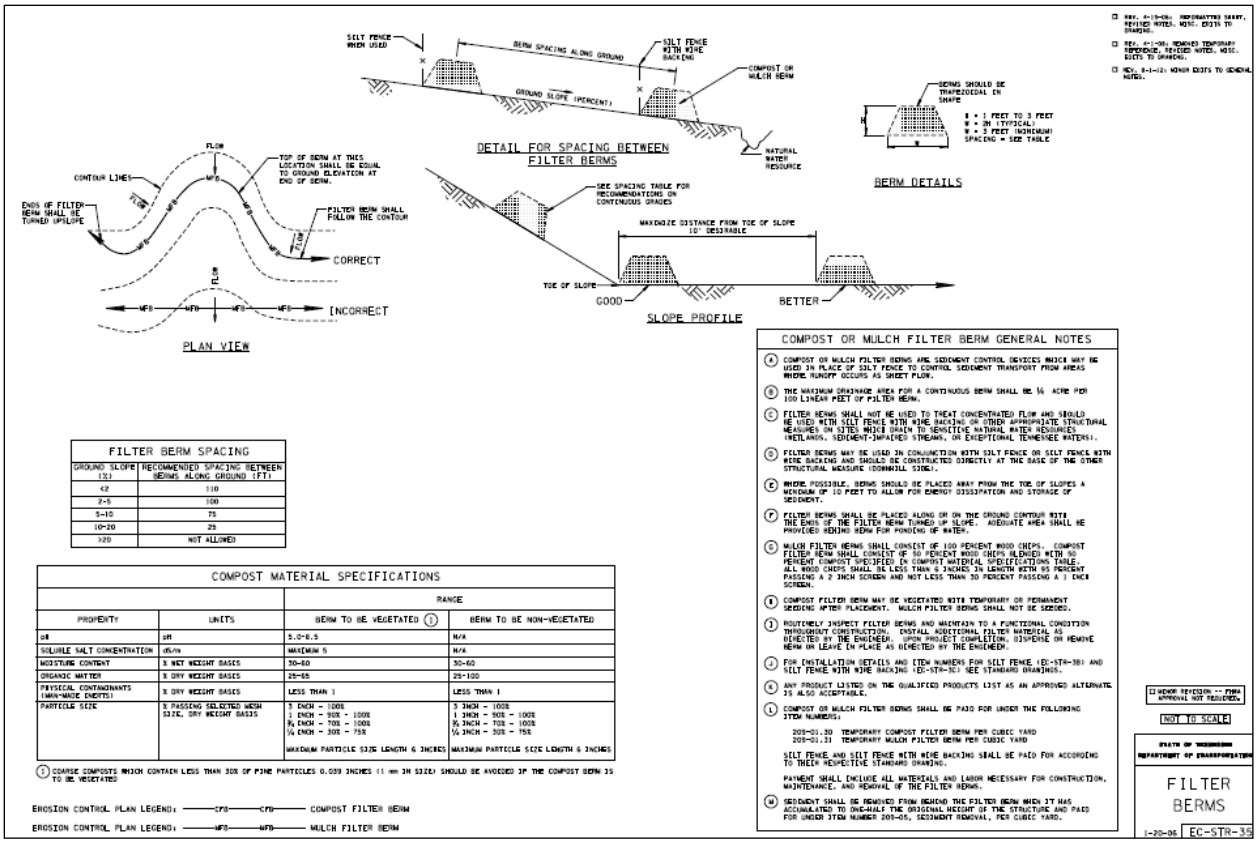

TEMPORARY DIVERSION CULVERT WITH CHANNEL TRANSITIONS
TEMPORARY DIVERSION CULVERT WITH ELBOWS
PLAN VIEW
PLAN VIEW
SECTION A-A
SECTION B-B
SECTION C-C
TRANSITION CHANNEL CROSS-SECTION
TEMPORARY DIVERSION CULVERTS GENERAL NOTES
TEMPORARY DIVERSION CULVERT SELECTION
FLOW CAPACITY IN CFS OF A GIVEN PIPE AT A GIVEN CHANNEL SLOPE
EROSION CONTROL PLAN LEGEND: TEMPORARY DIVERSION CULVERT (DESCRIBE NUMBER AND SIZE OF PIPES)
TEMPORARY DIVERSION CULVERTS
EC-STR-32


MAXIMUM SPAN FOR PIPE SUPPORTS, FEET
PLAN VIEW
SAND BAG PLUG & BERM CROSS SECTION
SECTION A-A
SECTION B-B
SUSPENDED PIPE DIVERSION (DOWNSTREAM) GENERAL NOTES
EROSION CONTROL PLAN LEGEND: SUSPENDED PIPE DIVERSION
SUSPENDED PIPE DIVERSION (DOWNSTREAM)
EC-STR-33



DIAMETER OF PIPE (IN.)	STEEL THICKNESS (IN.)				
	0.064	0.079	0.109	0.138	0.168
	2" X ½" CORRUGATION				
24	13	15	20		
36	12	15	20	25	
48	11	14	19	25	30
60		14	19	24	29
72			18	24	29
	5" X 1" OR 3" X 1" CORRUGATION				
36	9	11			
48	9	11	15		
60	8	10	14	18	
72	8	10	14	18	22





FILTER BERM SPACING	
GROUND SLOPE (%)	RECOMMENDED SPACING BETWEEN BERMS ALONG GROUND (FT)
<2	110
2-5	100
5-10	75
10-20	25
>20	NOT ALLOWED

COMPOST MATERIAL SPECIFICATIONS			
		RANGE	
PROPERTY	UNITS	BERM TO BE VEGETATED (1)	BERM TO BE NON-VEGETATED
pH	pH	5.0-8.5	N/A
SOLUBLE SALT CONCENTRATION	dS/m	MAXIMUM 5	N/A
MOISTURE CONTENT	% WET WEIGHT BASES	30-60	30-60
ORGANIC MATTER	% DRY WEIGHT BASES	25-65	25-100
PHYSICAL CONTAMINANTS (MAN-MADE INERTS)	% DRY WEIGHT BASES	LESS THAN 1	LESS THAN 1
PARTICLE SIZE	% PASSING SELECTED MESH SIZE, DRY WEIGHT BASIS	3 INCH - 100% 1 INCH - 90% - 100% ¾ INCH - 70% - 100% ¼ INCH - 30% - 75% MAXIMUM PARTICLE SIZE LENGTH 6 INCHES	3 INCH - 100% 1 INCH - 90% - 100% ¾ INCH - 70% - 100% ¼ INCH - 30% - 75% MAXIMUM PARTICLE SIZE LENGTH 6 INCHES

(1) COARSE COMPOSTS WHICH CONTAIN LESS THAN 30% OF FINE PARTICLES 0.039 INCHES (1 mm IN SIZE) SHOULD BE AVOIDED IF THE COMPOST BERM IS TO BE VEGETATED

EROSION CONTROL PLAN LEGEND: —CFB—CFB— COMPOST FILTER BERM

EROSION CONTROL PLAN LEGEND: —MFB—MFB— MULCH FILTER BERM

COMPOST OR MULCH FILTER BERM GENERAL NOTES

(A) COMPOST OR MULCH FILTER BERMS ARE SEDIMENT CONTROL DEVICES WHICH MAY BE USED IN PLACE OF SILT FENCE TO CONTROL SEDIMENT TRANSPORT FROM AREAS WHERE RUNOFF OCCURS AS SHEET FLOW.

(B) THE MAXIMUM DRAINAGE AREA FOR A CONTINUOUS BERM SHALL BE ¼ ACRE PER 100 LINEAR FEET OF FILTER BERM.

(C) FILTER BERMS SHALL NOT BE USED TO TREAT CONCENTRATED FLOW AND SHOULD BE USED WITH SILT FENCE WITH WIRE BACKING OR OTHER APPROPRIATE STRUCTURAL MEASURES ON SITES WHICH DRAIN TO SENSITIVE NATURAL WATER RESOURCES (WETLANDS, SEDIMENT-IMPAIRED STREAMS, OR EXCEPTIONAL TENNESSEE WATERS).

(D) FILTER BERMS MAY BE USED IN CONJUNCTION WITH SILT FENCE OR SILT FENCE WITH WIRE BACKING AND SHOULD BE CONSTRUCTED DIRECTLY AT THE BASE OF THE OTHER STRUCTURAL MEASURE (DOWNHILL SIDE).

(E) WHERE POSSIBLE, BERMS SHOULD BE PLACED AWAY FROM THE TOE OF SLOPES A MINIMUM OF 10 FEET TO ALLOW FOR ENERGY DISSIPATION AND STORAGE OF SEDIMENT.

(F) FILTER BERMS SHALL BE PLACED ALONG OR ON THE GROUND CONTOUR WITH THE ENDS OF THE FILTER BERM TURNED UP SLOPE. ADEQUATE AREA SHALL BE PROVIDED BEHIND BERM FOR PONDING OF WATER.

(G) MULCH FILTER BERMS SHALL CONSIST OF 100 PERCENT WOOD CHIPS. COMPOST FILTER BERM SHALL CONSIST OF 50 PERCENT WOOD CHIPS BLENDED WITH 50 PERCENT COMPOST SPECIFIED IN COMPOST MATERIAL SPECIFICATIONS TABLE. ALL WOOD CHIPS SHALL BE LESS THAN 6 INCHES IN LENGTH WITH 95 PERCENT PASSING A 2 INCH SCREEN AND NOT LESS THAN 30 PERCENT PASSING A 1 INCH SCREEN.

(H) COMPOST FILTER BERM MAY BE VEGETATED WITH TEMPORARY OR PERMANENT SEEDING AFTER PLACEMENT. MULCH FILTER BERMS SHALL NOT BE SEEDED.

(I) ROUTINELY INSPECT FILTER BERMS AND MAINTAIN TO A FUNCTIONAL CONDITION THROUGHOUT CONSTRUCTION. INSTALL ADDITIONAL FILTER MATERIALS AS DIRECTED BY THE ENGINEER. UPON PROJECT COMPLETION, DISPERSE OR REMOVE BERM ON SLOPE IN PLACE AS DIRECTED BY THE ENGINEER.

(J) FOR INSTALLATION DETAILS AND ITEM NUMBERS FOR SILT FENCE (EC-STR-3B) AND SILT FENCE WITH WIRE BACKING (EC-STR-3C) SEE STANDARD DRAWINGS.

(K) ANY PRODUCT LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE IS ALSO ACCEPTABLE.

(L) COMPOST OR MULCH FILTER BERMS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

209-01.30 TEMPORARY COMPOST FILTER BERM PER CUBIC YARD
209-01.31 TEMPORARY MULCH FILTER BERM PER CUBIC YARD

SILT FENCE AND SILT FENCE WITH WIRE BACKING SHALL BE PAID FOR ACCORDING TO THEIR RESPECTIVE STANDARD DRAWING.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE FILTER BERMS.

(M) SEDIMENT SHALL BE REMOVED FROM BEHIND THE FILTER BERM WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL, PER CUBIC YARD.

REV. 4-15-08: REFORMATTED SHEET, REVISED NOTES. MISC. EDITS TO DRAWING.

REV. 4-1-08: REMOVED TEMPORARY REFERENCE, REVISED NOTES. MISC. EDITS TO DRAWING.

REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.

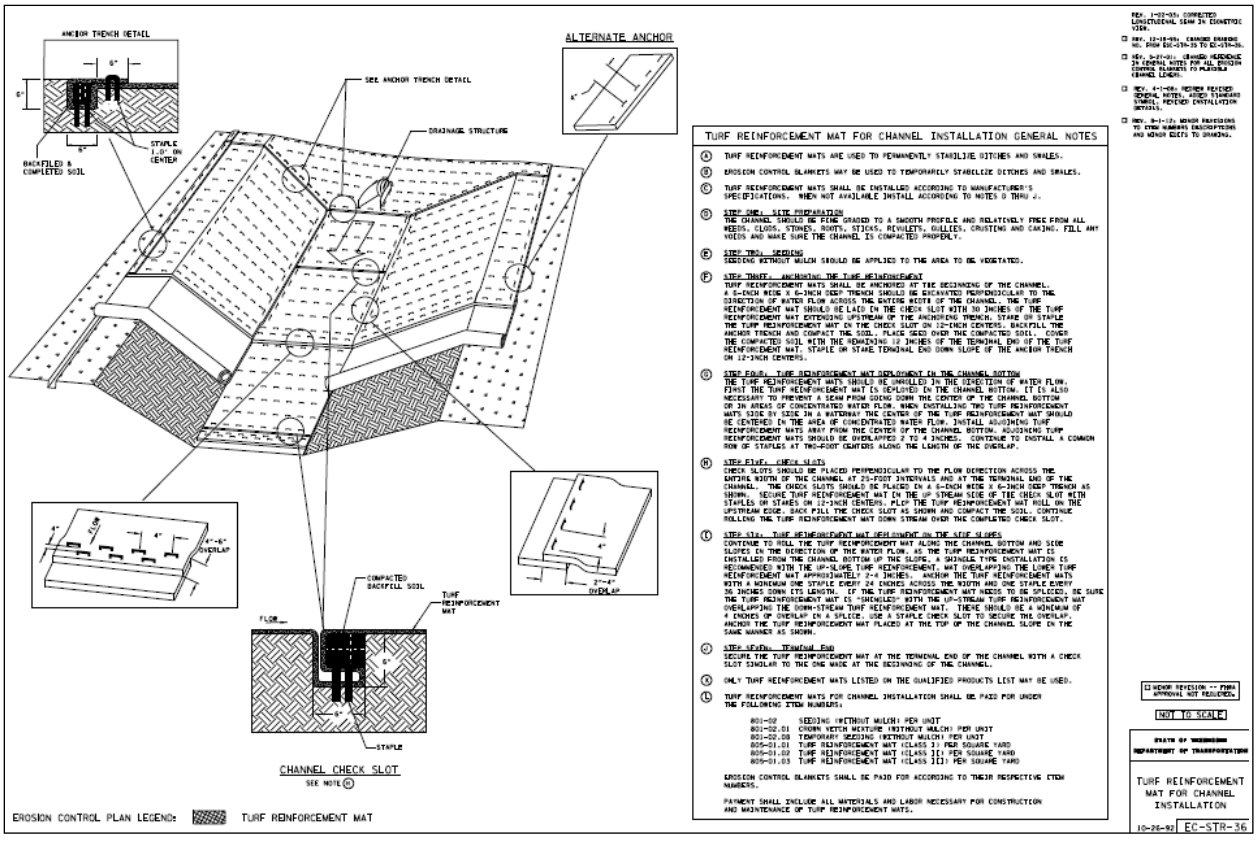
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

FILTER BERMS

1-20-06 EC-STR-35



TURF REINFORCEMENT MAT FOR CHANNEL INSTALLATION GENERAL NOTES

(A) TURF REINFORCEMENT MATS ARE USED TO PERMANENTLY STABILIZE DITCHES AND SWALES.

(B) EROSION CONTROL BLANKETS MAY BE USED TO TEMPORARILY STABILIZE DITCHES AND SWALES.

(C) TURF REINFORCEMENT MATS SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS. WHEN NOT AVAILABLE INSTALL ACCORDING TO NOTES D THRU J.

(D) STEP ONE: SITE PREPARATION
THE CHANNEL SHOULD BE FINE GRADED TO A SMOOTH PROFILE AND RELATIVELY FREE FROM ALL WEEDS, CLODS, STONES, ROOTS, STICKS, RIVULETS, GULLIES, CRUSTING AND CAKING. FILL ANY VOIDS AND MAKE SURE THE CHANNEL IS COMPACTED PROPERLY.

(E) STEP TWO: SEEDING
SEEDING WITHOUT MULCH SHOULD BE APPLIED TO THE AREA TO BE VEGETATED.

(F) STEP THREE: ANCHORING THE TURF REINFORCEMENT
TURF REINFORCEMENT MATS SHALL BE ANCHORED AT THE BEGINNING OF THE CHANNEL. A 6-INCH WIDE X 6-INCH DEEP TRENCH SHOULD BE EXCAVATED PERPENDICULAR TO THE DIRECTION OF WATER FLOW ACROSS THE ENTIRE WIDTH OF THE CHANNEL. THE TURF REINFORCEMENT MAT SHALL BE LAID IN THE CHECK SLOT WITH 36 INCHES OF THE TURF REINFORCEMENT MAT EXTENDING UPSTREAM OF THE ANCHORING TRENCH. STAKE OR STAPLE THE TURF REINFORCEMENT MAT IN THE CHECK SLOT ON 12-INCH CENTERS. BACKFILL THE ANCHOR TRENCH AND COMPACT THE SOIL. PLACE SEED OVER THE COMPACTED SOIL. COVER THE COMPACTED SOIL WITH THE REMAINING 12 INCHES OF THE TERMINAL END OF THE TURF REINFORCEMENT MAT. STAPLE OR STAKE TERMINAL END DOWN SLOPE OF THE ANCHOR TRENCH ON 12-INCH CENTERS.

(G) STEP FOUR: TURF REINFORCEMENT MAT DEPLOYMENT IN THE CHANNEL BOTTOM
THE TURF REINFORCEMENT MATS SHALL BE UNROLLED IN THE DIRECTION OF WATER FLOW. FIRST THE TURF REINFORCEMENT MAT IS DEPLOYED IN THE CHANNEL BOTTOM. IT IS ALSO NECESSARY TO PREVENT A SEAM FROM GOING DOWN THE CENTER OF THE CHANNEL BOTTOM OR IN AREAS OF CONCENTRATED WATER FLOW. WHEN INSTALLING TWO TURF REINFORCEMENT MATS SIDE BY SIDE IN A WATERWAY THE CENTER OF THE TURF REINFORCEMENT MAT SHOULD BE CENTERED IN THE AREA OF CONCENTRATED WATER FLOW. INSTALL ADJOINING TURF REINFORCEMENT MATS AWAY FROM THE CENTER OF THE CHANNEL BOTTOM. ADJOINING TURF REINFORCEMENT MATS SHOULD BE OVERLAPPED 2 TO 4 INCHES. CONTINUE TO INSTALL A COMMON ROW OF STAPLES AT TWO-FOOT CENTERS ALONG THE LENGTH OF THE OVERLAP.

(H) STEP FIVE: CHECK SLOTS
CHECK SLOTS SHOULD BE PLACED PERPENDICULAR TO THE FLOW DIRECTION ACROSS THE ENTIRE WIDTH OF THE CHANNEL AT 25-FOOT INTERVALS AND AT THE TERMINAL END OF THE CHANNEL. THE CHECK SLOTS SHALL BE PLACED IN A 6-INCH WIDE X 6-INCH DEEP TRENCH AS SHOWN. SECURE TURF REINFORCEMENT MAT IN THE UP STREAM SIDE OF THE CHECK SLOT WITH STAPLES OR STAKES ON 12-INCH CENTERS. PLEP THE TURF REINFORCEMENT MAT ROLL ON THE UPSTREAM EDGE. BACK FILL THE CHECK SLOT AS SHOWN AND COMPACT THE SOIL. CONTINUE ROLLING THE TURF REINFORCEMENT MAT DOWN STREAM OVER THE COMPLETED CHECK SLOT.

(I) STEP SIX: TURF REINFORCEMENT MAT DEPLOYMENT ON THE SIDE SLOPES
CONTINUE TO ROLL THE TURF REINFORCEMENT MAT ALONG THE CHANNEL BOTTOM AND SIDE SLOPES IN THE DIRECTION OF THE WATER FLOW, AS THE TURF REINFORCEMENT MAT IS INSTALLED FROM THE CHANNEL BOTTOM UP THE SLOPE, A SHINGLE TYPE INSTALLATION IS RECOMMENDED WITH THE UP-SLOPE TURF REINFORCEMENT MAT OVERLAPPING THE LOWER TURF REINFORCEMENT MAT APPROXIMATELY 2-4 INCHES. ANCHOR THE TURF REINFORCEMENT MATS WITH A MINIMUM ONE STAPLE EVERY 24 INCHES ACROSS THE WIDTH AND ONE STAPLE EVERY 36 INCHES DOWN ITS LENGTH. IF THE TURF REINFORCEMENT MAT NEEDS TO BE SPLICED, BE SURE THE TURF REINFORCEMENT MAT IS "SHINGLED" WITH THE UP-STREAM TURF REINFORCEMENT MAT OVERLAPPING THE DOWN-STREAM TURF REINFORCEMENT MAT. THERE SHOULD BE A MINIMUM OF 4 INCHES OF OVERLAP ON A SPLICE. USE A STAPLE CHECK SLOT TO SECURE THE OVERLAP. ANCHOR THE TURF REINFORCEMENT MAT PLACED AT THE TOP OF THE CHANNEL SLOPE IN THE SAME MANNER AS SHOWN.

(J) STEP SEVEN: TERMINAL END
SECURE THE TURF REINFORCEMENT MAT AT THE TERMINAL END OF THE CHANNEL WITH A CHECK SLOT SIMILAR TO THE ONE MADE AT THE BEGINNING OF THE CHANNEL.

(K) ONLY TURF REINFORCEMENT MATS LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED.

(L) TURF REINFORCEMENT MATS FOR CHANNEL INSTALLATION SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

801-02 SEEDING (WITHOUT MULCH) PER UNIT
801-02.01 CROWN VETCH MIXTURE (WITHOUT MULCH) PER UNIT
801-02.08 TEMPORARY SEEDING (WITHOUT MULCH) PER UNIT
805-01.01 TURF REINFORCEMENT MAT (CLASS I) PER SQUARE YARD
805-01.02 TURF REINFORCEMENT MAT (CLASS II) PER SQUARE YARD
805-01.03 TURF REINFORCEMENT MAT (CLASS III) PER SQUARE YARD

EROSION CONTROL BLANKETS SHALL BE PAID FOR ACCORDING TO THEIR RESPECTIVE ITEM NUMBERS.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION AND MAINTENANCE OF TURF REINFORCEMENT MATS.

REV. 1-22-03: CORRECTED LONGITUDINAL SEAM IN ISOMETRIC VIEW.

REV. 12-18-09: CHANGED DRAWING NO. FROM EC-STR-35 TO EC-STR-36.

REV. 8-27-01: CHANGED REFERENCE IN GENERAL NOTES FOR ALL EROSION CONTROL BLANKETS TO FLEXIBLE CHANNEL LINERS.

REV. 4-1-08: REVISED REVISED GENERAL NOTES, ADDED STANDARD SYMBOL, REVISED INSTALLATION DETAILS.

REV. 8-1-12: MINOR REVISIONS TO ITEM NUMBERS DESCRIPTIONS AND MINOR EDITS TO DRAWING.

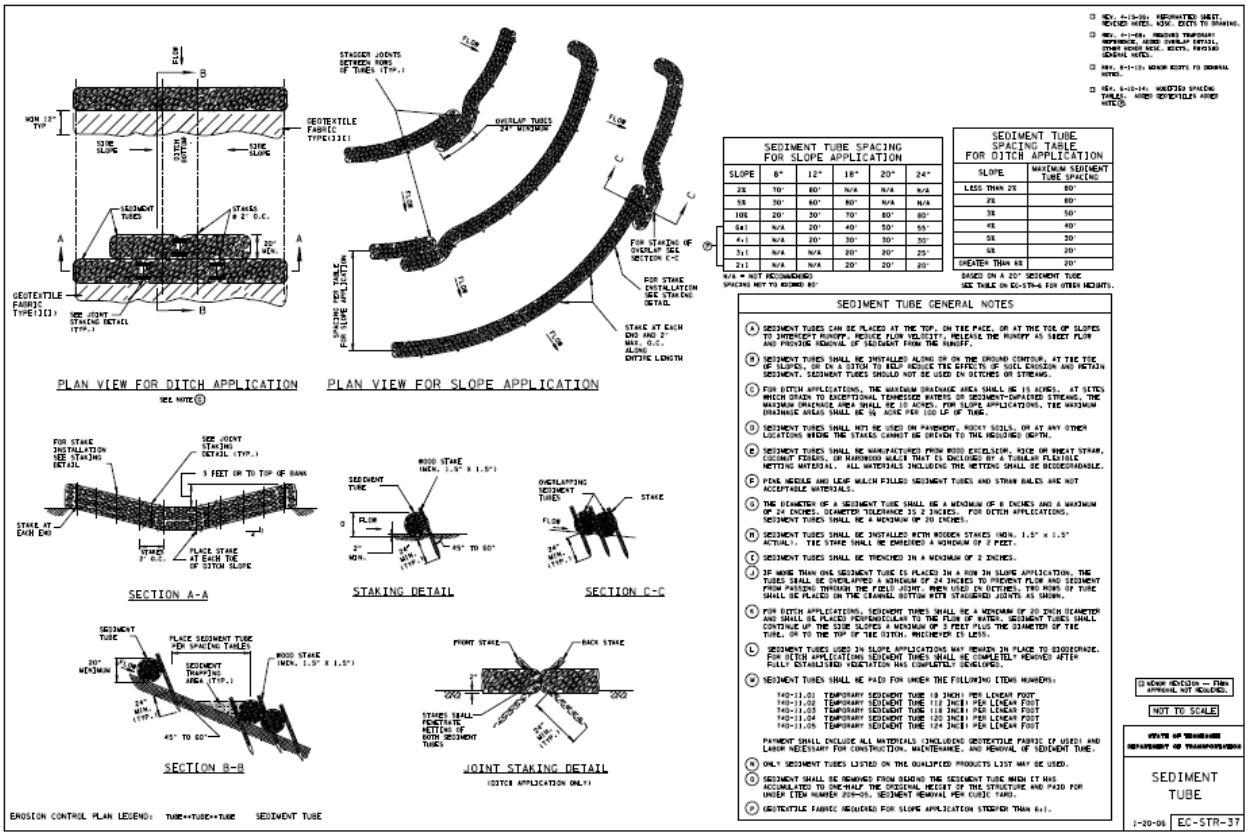
☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

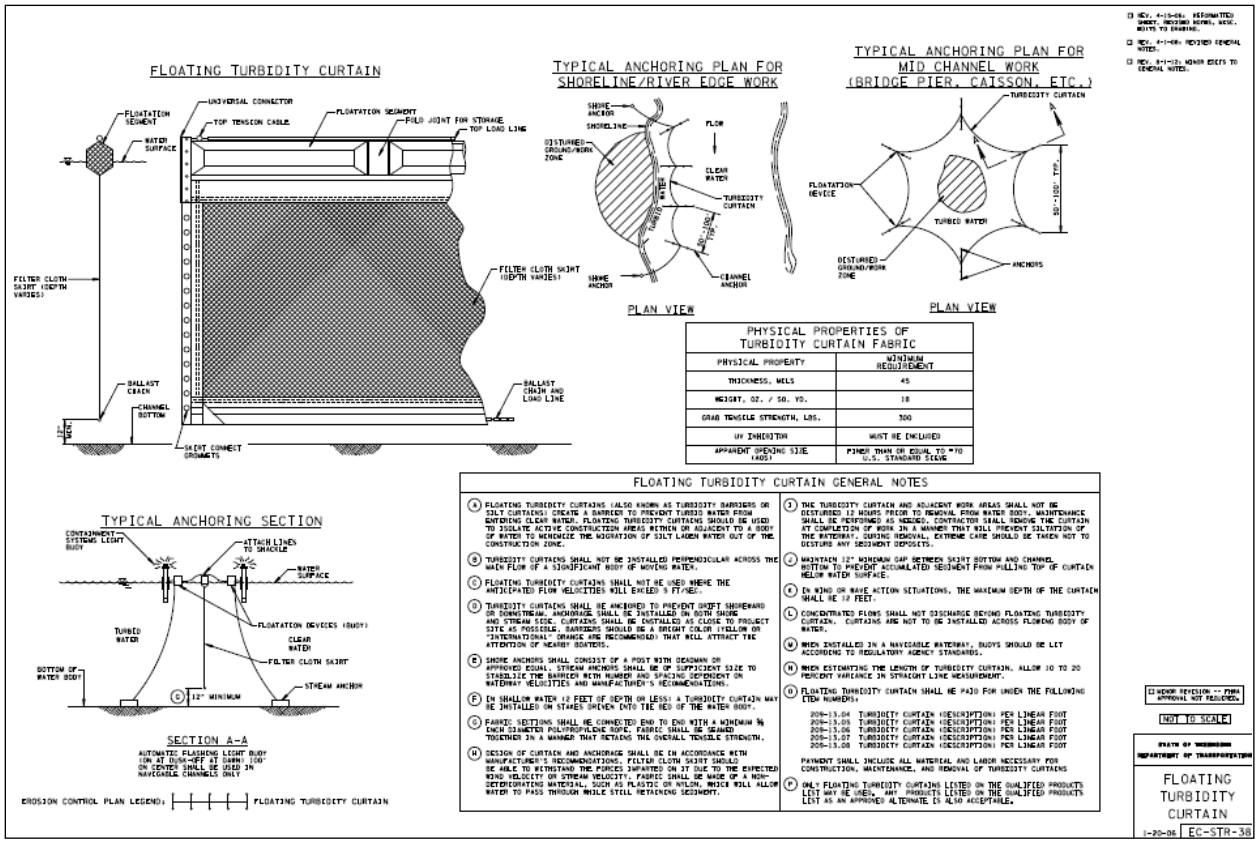
NOT TO SCALE

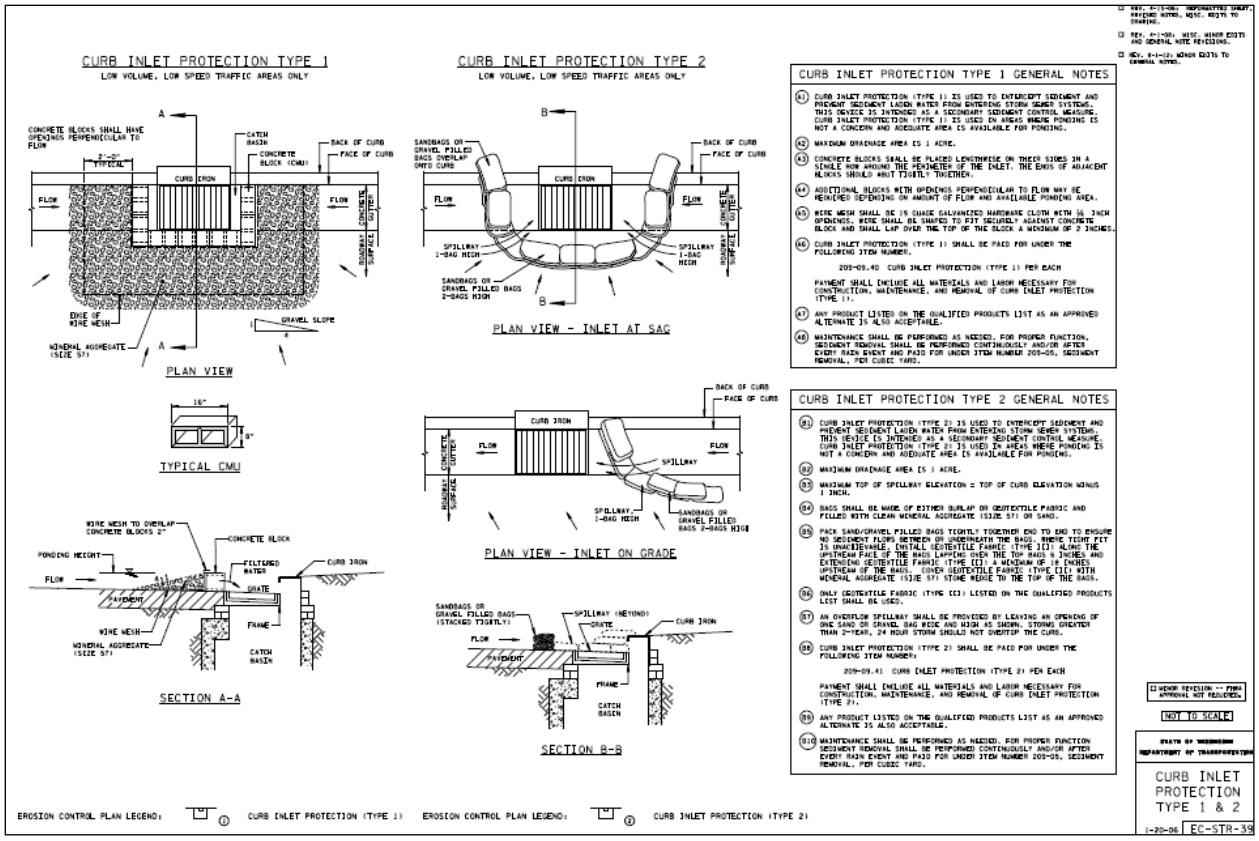
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

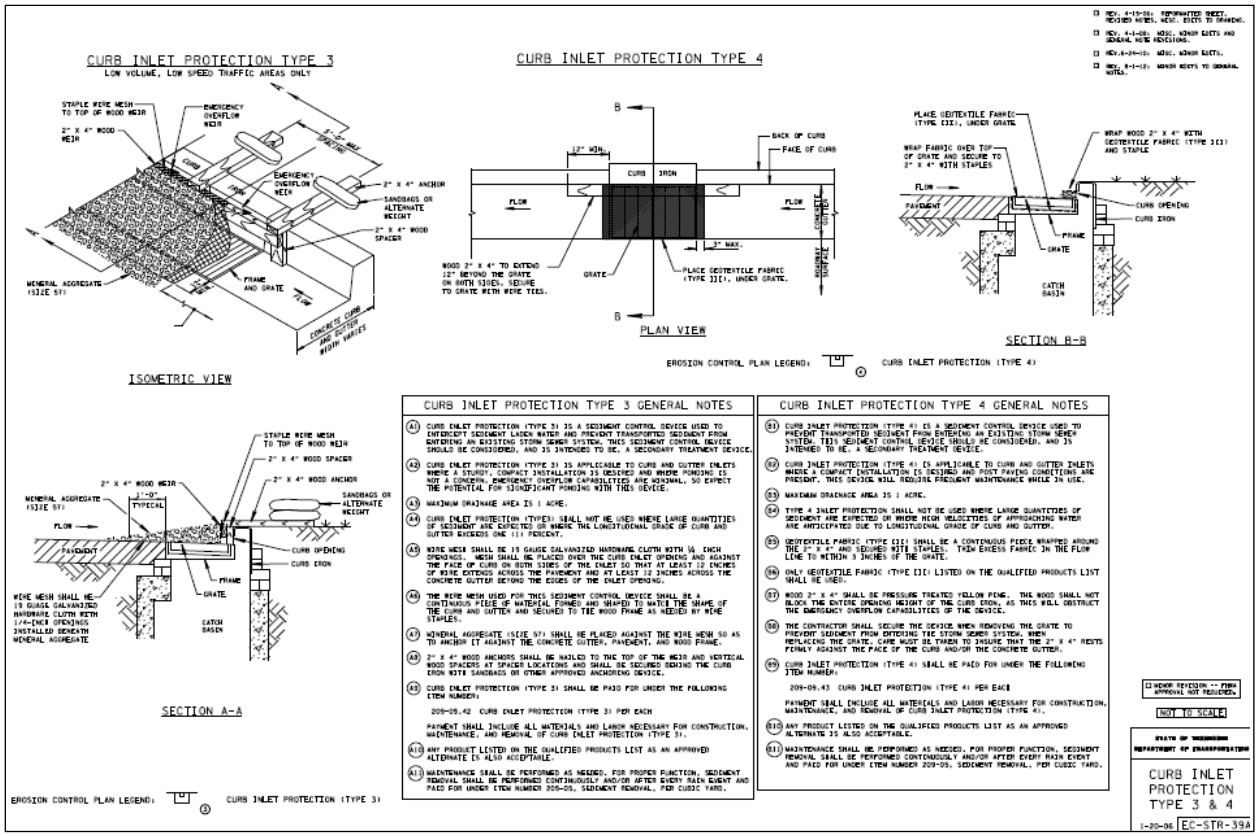
TURF REINFORCEMENT MAT FOR CHANNEL INSTALLATION

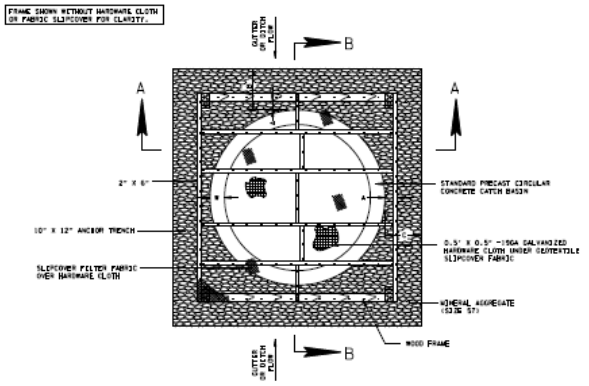
10-26-92 EC-STR-36


PLAN VIEW FOR DITCH APPLICATION
PLAN VIEW FOR SLOPE APPLICATION
SECTION A-A
STAKING DETAIL
SECTION C-C
SECTION B-B
JOINT STAKING DETAIL
(DITCH APPLICATION ONLY)
SEDIMENT TUBE SPACING FOR SLOPE APPLICATION
SLOPE | 8" | 12" | 18" | 20" | 24"
2% | 70' | 80' | N/A | N/A | N/A
5% | 30' | 60' | 80' | N/A | N/A
10% | 20' | 30' | 70' | 80' | 80'
6:1 | N/A | 20' | 40' | 50' | 55'
4:1 | N/A | 20' | 30' | 30' | 30'
3:1 | N/A | N/A | 20' | 20' | 25'
2:1 | N/A | N/A | 20' | 20' | 20'
N/A = NOT RECOMMENDED
SPACING NOT TO EXCEED 80'
SEDIMENT TUBE SPACING FOR DITCH APPLICATION
SLOPE | MAXIMUM SEDIMENT TUBE SPACING
LESS THAN 2% | 80'
2% | 60'
3% | 50'
4% | 40'
5% | 30'
6% | 20'
GREATER THAN 6% | 20'
BASED ON A 20' SEDIMENT TUBE
SEE TABLE ON EC-STR-6 FOR OTHER HEIGHTS.
SEDIMENT TUBE GENERAL NOTES
(A) SEDIMENT TUBES CAN BE PLACED AT THE TOP, ON THE FACE, OR AT THE TOE OF SLOPES TO INTERCEPT RUNOFF, REDUCE FLOW VELOCITY, RELEASE THE RUNOFF AS SHEET FLOW AND PROVIDE REMOVAL OF SEDIMENT FROM THE RUNOFF.
(B) SEDIMENT TUBES SHALL BE INSTALLED ALONG OR ON THE GROUND CONTOUR, AT THE TOE OF SLOPES, OR ON A BENCH TO HELP REDUCE THE EFFECTS OF SHEET EROSION AND RETAIN SEDIMENT. SEDIMENT TUBES SHOULD NOT BE USED ON DITCHES OR STREAMS.
(C) FOR DITCH APPLICATIONS, THE MAXIMUM DRAINAGE AREA SHALL BE 15 ACRES. AT SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, THE MAXIMUM DRAINAGE AREA SHALL BE 10 ACRES. FOR SLOPE APPLICATIONS, THE MAXIMUM DRAINAGE AREAS SHALL BE ½ ACRE PER 100 LF OF TUBE.
(D) SEDIMENT TUBES SHALL NOT BE USED ON PAVEMENT, ROCKY SOILS, OR AT ANY OTHER LOCATIONS WHERE THE STAKES CANNOT BE DRIVEN TO THE REQUIRED DEPTH.
(E) SEDIMENT TUBES SHALL BE MANUFACTURED FROM WOOD EXCELSIOR, RICE OR WHEAT STRAW, COCONUT FIBERS, OR HARDWOOD MULCH THAT IS ENCLOSED BY A TUBULAR FLEXIBLE NETTING MATERIAL. ALL MATERIALS INCLUDING THE NETTING SHALL BE BIODEGRADABLE.
(F) PINE NEEDLE AND LEAF MULCH FILLED SEDIMENT TUBES AND STRAW BALES ARE NOT ACCEPTABLE MATERIALS.
(G) THE DIAMETER OF A SEDIMENT TUBE SHALL BE A MINIMUM OF 8 INCHES AND A MAXIMUM OF 24 INCHES. DIAMETER TOLERANCE IS ± 2 INCHES. FOR DITCH APPLICATIONS, SEDIMENT TUBES SHALL BE A MINIMUM OF 20 INCHES.
(H) SEDIMENT TUBES SHALL BE INSTALLED WITH WOODEN STAKES (MIN. 1.5" x 1.5" ACTUAL). THE STAKE SHALL BE EMBEDDED A MINIMUM OF 2 FEET.
(I) SEDIMENT TUBES SHALL BE TRENCHED IN A MINIMUM OF 2 INCHES.
(J) IF MORE THAN ONE SEDIMENT TUBE IS PLACED IN A RUN IN SLOPE APPLICATION, THE TUBES SHALL BE OVERLAPPED A MINIMUM OF 24 INCHES TO PREVENT FLOW AND SEDIMENT FROM PASSING THROUGH THE FIELD JOINT. WHEN USED IN DITCHES, TWO ROWS OF TUBE SHALL BE PLACED ON THE CHANNEL BOTTOM WITH STAGGERED JOINTS AS SHOWN.
(K) FOR DITCH APPLICATIONS, SEDIMENT TUBES SHALL BE A MINIMUM OF 20 INCH DIAMETER AND SHALL BE PLACED PERPENDICULAR TO THE FLOW OF WATER. SEDIMENT TUBES SHALL CONTINUE UP THE SIDE SLOPES A MINIMUM OF 3 FEET PLUS THE DIAMETER OF THE TUBE, OR TO THE TOP OF THE DITCH, WHICHEVER IS LESS.
(L) SEDIMENT TUBES USED IN SLOPE APPLICATIONS MAY REMAIN IN PLACE TO BIODEGRADE. FOR DITCH APPLICATIONS SEDIMENT TUBES SHALL BE COMPLETELY REMOVED AFTER FULLY ESTABLISHED VEGETATION HAS COMPLETELY DEVELOPED.
(M) SEDIMENT TUBES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:
740-13.01 TEMPORARY SEDIMENT TUBE 08 INCH) PER LINEAR FOOT
740-13.02 TEMPORARY SEDIMENT TUBE 112 INCH) PER LINEAR FOOT
740-13.03 TEMPORARY SEDIMENT TUBE 116 INCH) PER LINEAR FOOT
740-13.04 TEMPORARY SEDIMENT TUBE 120 INCH) PER LINEAR FOOT
740-13.05 TEMPORARY SEDIMENT TUBE 124 INCH) PER LINEAR FOOT
PAYMENT SHALL INCLUDE ALL MATERIALS (INCLUDING GEOTEXTILE FABRIC IF USED) AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF SEDIMENT TUBE.
(N) ONLY SEDIMENT TUBES LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED.
(O) SEDIMENT SHALL BE REMOVED FROM BEHIND THE SEDIMENT TUBE WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER CUBIC YARD.
(P) (GEOTEXTILE FABRIC REQUIRED FOR SLOPE APPLICATION STEEPER THAN 6:1).
EROSION CONTROL PLAN LEGEND: TUBE++TUBE++TUBE SEDIMENT TUBE
NOT TO SCALE
SEDIMENT TUBE
1-20-06 EC-STR-37


FLOATING TURBIDITY CURTAIN
TYPICAL ANCHORING PLAN FOR SHORELINE/RIVER EDGE WORK
TYPICAL ANCHORING PLAN FOR MID CHANNEL WORK (BRIDGE PIER, CAISSON, ETC.)
PLAN VIEW
PLAN VIEW
PHYSICAL PROPERTIES OF TURBIDITY CURTAIN FABRIC
PHYSICAL PROPERTY | MINIMUM REQUIREMENT
THICKNESS, MILS | 45
WEIGHT, OZ. / SQ. YD. | 18
GRAB TENSILE STRENGTH, LBS. | 300
UV INHIBITOR | MUST BE INCLUDED
APPARENT OPENING SIZE (AOS) | FINER THAN OR EQUAL TO #70 U.S. STANDARD SIEVE
TYPICAL ANCHORING SECTION
SECTION A-A
AUTOMATIC FLASHING LIGHT BUOY ON AT DUSK-OFF AT DAWN) 100' ON CENTER SHALL BE USED IN NAVIGABLE CHANNELS ONLY
EROSION CONTROL PLAN LEGEND: FLOATING TURBIDITY CURTAIN
FLOATING TURBIDITY CURTAIN GENERAL NOTES
(A) FLOATING TURBIDITY CURTAINS (ALSO KNOWN AS TURBIDITY BARRIERS OR SILT CURTAINS) CREATE A BARRIER TO PREVENT TURBID WATER FROM ENTERING CLEAR WATER. FLOATING TURBIDITY CURTAINS SHOULD BE USED TO ISOLATE ACTIVE CONSTRUCTION AREAS WITHIN OR ADJACENT TO A BODY OF WATER TO MINIMIZE THE MIGRATION OF SILT LADEN WATER OUT OF THE CONSTRUCTION ZONE.
(B) TURBIDITY CURTAINS SHALL NOT BE INSTALLED PERPENDICULAR ACROSS THE MAIN FLOW OF A SIGNIFICANT BODY OF MOVING WATER.
(C) FLOATING TURBIDITY CURTAINS SHALL NOT BE USED WHERE THE ANTICIPATED FLOW VELOCITIES WILL EXCEED 5 FT/SEC.
(D) TURBIDITY CURTAINS SHALL BE ANCHORED TO PREVENT DRIFT SHOREWARD OR DOWNSTREAM. ANCHORAGE SHALL BE INSTALLED ON BOTH SHORE AND STREAM SIDE. CURTAINS SHALL BE INSTALLED AS CLOSE TO PROJECT SITE AS POSSIBLE. BARRIERS SHOULD BE A BRIGHT COLOR (YELLOW OR "INTERNATIONAL" ORANGE ARE RECOMMENDED) THAT WILL ATTRACT THE ATTENTION OF NEARBY BOATERS.
(E) SHORE ANCHORS SHALL CONSIST OF A POST WITH DEADMAN OR APPROVED EQUAL. STREAM ANCHORS SHALL BE OF SUFFICIENT SIZE TO STABILIZE THE BARRIER WITH NUMBER AND SPACING DEPENDENT ON WATERWAY VELOCITIES AND MANUFACTURER'S RECOMMENDATIONS.
(F) IN SHALLOW WATER (2 FEET OF DEPTH OR LESS) A TURBIDITY CURTAIN MAY BE INSTALLED ON STAKES DRIVEN INTO THE BED OF THE WATER BODY.
(G) FABRIC SECTIONS SHALL BE CONNECTED END TO END WITH A MINIMUM ⅝ INCH DIAMETER POLYPROPYLENE ROPE. FABRIC SHALL BE SEAMED TOGETHER IN A MANNER THAT RETAINS THE OVERALL TENSILE STRENGTH.
(H) DESIGN OF CURTAIN AND ANCHORAGE SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. FILTER CLOTH SKIRT SHOULD BE ABLE TO WITHSTAND THE FORCES IMPARTED ON IT DUE TO THE EXPECTED WIND VELOCITY OR STREAM VELOCITY. FABRIC SHALL BE MADE OF A NON-DETERIORATING MATERIAL SUCH AS PLASTIC OR NYLON, WHICH WILL ALLOW WATER TO PASS THROUGH WHILE STILL RETAINING SEDIMENT.
(I) THE TURBIDITY CURTAIN AND ADJACENT WORK AREAS SHALL NOT BE DISTURBED 12 HOURS PRIOR TO REMOVAL FROM WATER BODY. MAINTENANCE SHALL BE PERFORMED AS NEEDED. CONTRACTOR SHALL REMOVE THE CURTAIN AT COMPLETION OF WORK IN A MANNER THAT WILL PREVENT SILTATION OF THE WATERWAY. DURING REMOVAL, EXTREME CARE SHOULD BE TAKEN NOT TO DISTURB ANY SEDIMENT DEPOSITS.
(J) MAINTAIN 12" MINIMUM GAP BETWEEN SKIRT BOTTOM AND CHANNEL BOTTOM TO PREVENT ACCUMULATED SEDIMENT FROM PULLING TOP OF CURTAIN BELOW WATER SURFACE.
(K) IN WIND OR WAVE ACTION SITUATIONS, THE MAXIMUM DEPTH OF THE CURTAIN SHALL BE 10 FEET.
(L) CONCENTRATED FLOWS SHALL NOT DISCHARGE BEYOND FLOATING TURBIDITY CURTAIN. CURTAINS ARE NOT TO BE INSTALLED ACROSS FLOWING BODY OF WATER.
(M) WHEN INSTALLED IN A NAVIGABLE WATERWAY, BUOYS SHOULD BE LIT ACCORDING TO REGULATORY AGENCY STANDARDS.
(N) WHEN ESTIMATING THE LENGTH OF TURBIDITY CURTAIN, ALLOW 10 TO 20 PERCENT VARIANCE IN STRAIGHT LINE MEASUREMENT.
(O) FLOATING TURBIDITY CURTAIN SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:
209-13.04 TURBIDITY CURTAIN (DESCRIPTION) PER LINEAR FOOT
209-13.05 TURBIDITY CURTAIN (DESCRIPTION) PER LINEAR FOOT
209-13.06 TURBIDITY CURTAIN (DESCRIPTION) PER LINEAR FOOT
209-13.07 TURBIDITY CURTAIN (DESCRIPTION) PER LINEAR FOOT
209-13.08 TURBIDITY CURTAIN (DESCRIPTION) PER LINEAR FOOT
PAYMENT SHALL INCLUDE ALL MATERIAL AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF TURBIDITY CURTAINS
(P) ONLY FLOATING TURBIDITY CURTAINS LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED. ANY PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE IS ALSO ACCEPTABLE.
NOT TO SCALE
FLOATING TURBIDITY CURTAIN
1-20-06 EC-STR-38

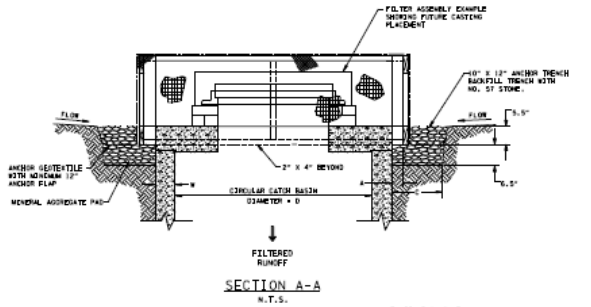

CURB INLET PROTECTION TYPE 1
LOW VOLUME, LOW SPEED TRAFFIC AREAS ONLY
CURB INLET PROTECTION TYPE 2
LOW VOLUME, LOW SPEED TRAFFIC AREAS ONLY
CURB INLET PROTECTION TYPE 1 GENERAL NOTES
CURB INLET PROTECTION TYPE 2 GENERAL NOTES
PLAN VIEW
PLAN VIEW - INLET AT SAG
TYPICAL CMU
PLAN VIEW - INLET ON GRADE
SECTION A-A
SECTION B-B
EROSION CONTROL PLAN LEGEND:
CURB INLET PROTECTION (TYPE 1)
EROSION CONTROL PLAN LEGEND:
CURB INLET PROTECTION (TYPE 2)
NOT TO SCALE
CURB INLET PROTECTION TYPE 1 & 2
1-20-06
EC-STR-39


CURB INLET PROTECTION TYPE 3
LOW VOLUME, LOW SPEED TRAFFIC AREAS ONLY
CURB INLET PROTECTION TYPE 4
ISOMETRIC VIEW
PLAN VIEW
SECTION B-B
SECTION A-A
EROSION CONTROL PLAN LEGEND:
CURB INLET PROTECTION (TYPE 4)
EROSION CONTROL PLAN LEGEND:
CURB INLET PROTECTION (TYPE 3)
CURB INLET PROTECTION TYPE 3 GENERAL NOTES
CURB INLET PROTECTION TYPE 4 GENERAL NOTES
NOT TO SCALE
CURB INLET PROTECTION TYPE 3 & 4
1-20-06
EC-STR-39A



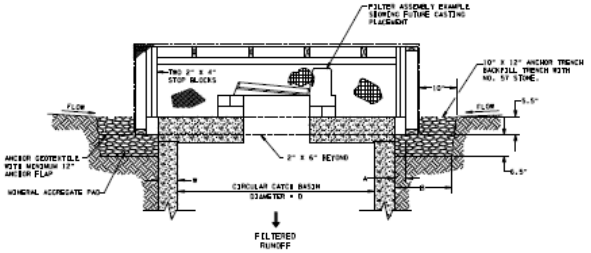
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY

N.T.S.



SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

60-INCH DIAMETER CIRCULAR STRUCTURE WITH CORRESPONDING TYPE 3 CATCH BASIN FILTER ASSEMBLY SHOWN ON THIS SHEET FOR REFERENCE PURPOSES. FOR OTHER SIZES-SEE APPLICABLE STANDARD DRAWINGS.

CIRCULAR CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

(A) DRAWING TO BE USED WITH STANDARD PRECAST CIRCULAR CATCH BASINS. SEE D-48-SERIES STANDARD DRAWINGS FOR CIRCULAR CATCH BASIN DIMENSIONS AND DETAILS.

(B) THE INLET AND FILTER ASSEMBLY SHOWN ON THIS STANDARD DRAWING ARE REPRESENTATIVE OF HOW THE EC-STR-40 SERIES OF STANDARD DRAWINGS APPLIES TO PRECAST CIRCULAR STRUCTURES. FOR SPECIFIC DETAILS AND INSTRUCTIONS REGARDING FRAMING, SPECIFICATIONS, OR SLIPCOVER FABRICATION, SEE THE APPLICABLE STANDARD DRAWING REFERENCED IN THE TABLE ON THIS SHEET.

(C) PAYMENT FOR CATCH BASIN FILTER ASSEMBLY FOR CIRCULAR STRUCTURES WILL BE MADE UNDER THE ITEM NUMBER LISTED ON THE APPLICABLE STANDARD DRAWING REFERENCED IN THE TABLE ON THIS SHEET.

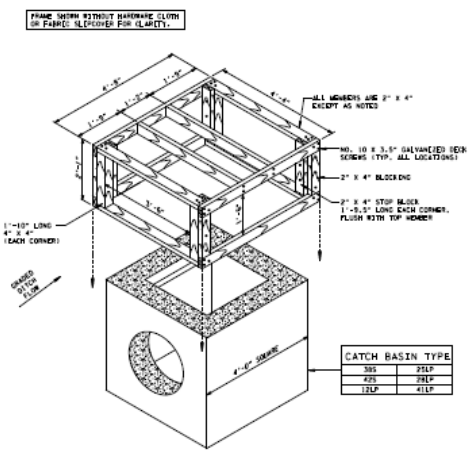
CIRCULAR STRUCTURE DIMENSION TABLE

INSIDE DIA. OF CATCH BASIN D (INCHES)	WALL THICKNESS W (INCHES)	CATCH BASIN FILTER ASSEMBLY TYPE	APPLICABLE STANDARD DRAWINGS	DIMENSION A (INCHES)	DIMENSION B (INCHES)	DIMENSION C (INCHES)
48	5	2	EC-STR-42 & 42A	3.5	17	15
60	6	3	EC-STR-43 & 43A	4.0	17.5	15.5
72	7	4	EC-STR-44 & 44A	8.0	21.5	19.5
84	8	4	EC-STR-44 & 44A	1.0	14.5	12.5
96	9	5	EC-STR-45 & 45A	8.0	21.5	19.5
108	10	5	EC-STR-45 & 45A	1.0	14.5	12.5

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY FOR CIRCULAR STRUCTURES

4-15-04 EC-STR-40



CATCH BASIN TYPE	
38S	2SLP
42S	29LP
13LP	41LP

ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY

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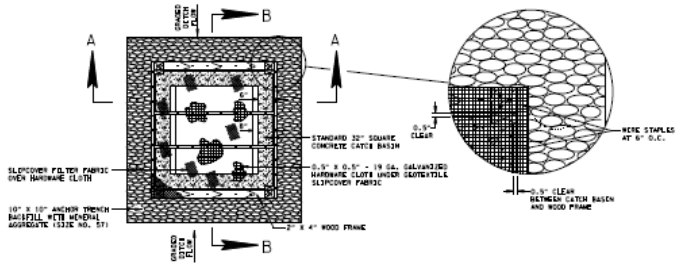
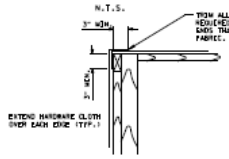


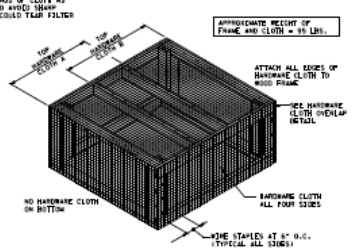
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY

N.T.S.



HARDWARE CLOTH OVERLAP DETAIL

N.T.S.



ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH

N.T.S.

EROSION CONTROL PLAN LEGEND: ① CATCH BASIN FILTER ASSEMBLY (TYPE 1)

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

(A) DRAWING TO BE USED WITH STANDARD TYPES 38S, 42S, AND 2-CB-SERIES LP CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.

(B) THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g., DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.

(C) 2 x 4 AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.

(D) PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)

(E) DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST BE GIVEN BY TDOT ENGINEER.

(F) ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.

(G) IF NECESSARY, AT DIRECTION OF TDOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.

(H) WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC., OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.

(I) ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.41, CATCH BASIN FILTER ASSEMBLY (TYPE 1), PER EACH.

INSTALLATION SEQUENCE FOR HARDWARE CLOTH

INSTALL TOP HARDWARE CLOTH A, FULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

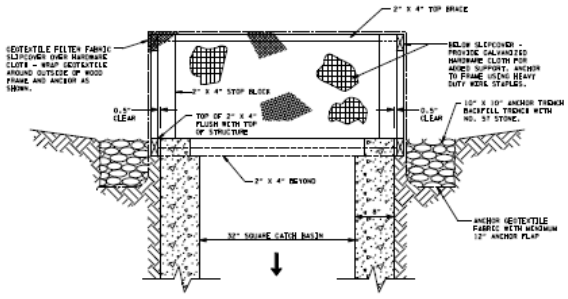
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.

TRIM EXCESS ALONG BOTTOM AS NECESSARY.

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 1)

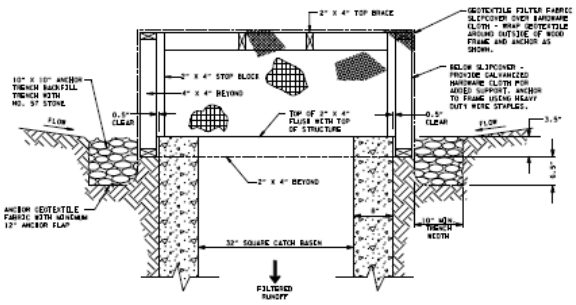
4-15-04 EC-STR-41



SECTION A-A

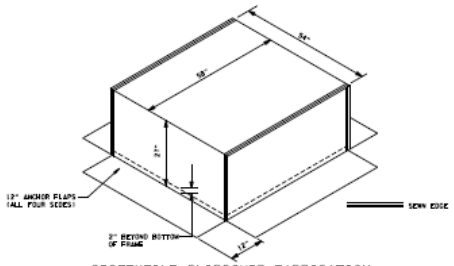
N.T.S.

SLIPCOVER FILTER SPECIFICATIONS		
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE		
FABRIC PROPERTY	ASTM TEST METHOD	MINIMUM AVERAGE ROLL VALUES (MARV)(1)
GRAB TENSILE STRENGTH	ASTM D4632	≥180 LBS
GRAB ELONGATION	ASTM D4632	≥50%
MULLEN BURST	ASTM D3786	≥330 PSI
PUNCTURE STRENGTH	ASTM D4833	≥105 LBS
TRAPEZOIDAL TEAR	ASTM D4533	≥75 LBS
APPARENT OPENING SIZE (AOS)	ASTM D4751	FINER THAN OR EQUAL TO #80 U.S. STANDARD SIEVE
PERMEABILITY	ASTM D4491	≥0.12 INCHES/SEC
PERMITTIVITY	ASTM D4491	≥1.5 SEC^{-1}
WATER FLUX	ASTM D4491	≥110 GAL/MIN/FT^2
UV RESISTANCE	ASTM D4355	≥70% AT 500 HOURS
WEIGHT	ASTM D3776	MINIMUM 6 OZ/YD^2
HARDWARE CLOTH SPECIFICATIONS		
STANDARD SPECIFICATION	ASTM A740	
OPENING SIZE	0.5 INCH X 0.5 INCH	
WIRE SIZE	19 GAUGE	
WIRE DIAMETER	0.041 INCHES	
WEIGHT	≥ 0.2 LBS/SF	
GRADE	LOW CARBON STEEL (C1008)	
TYPE	WELDED HOT GALVANIZED STEEL WIRE FABRIC	



SECTION B-B

N.T.S.



GEOTEXTILE SLIPCOVER FABRICATION

N.T.S.

FABRICATION SPECIFICATIONS:

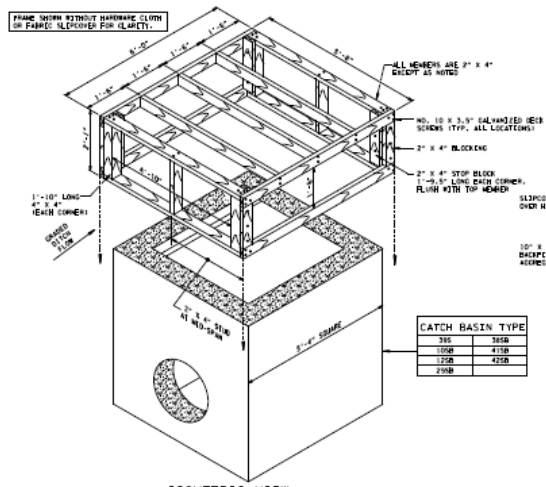
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO INDEPENDENT ROWS OF LOCK-TYPE STITCHING, USING UV-BONDED POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF 5.5% STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.

EROSION CONTROL PLAN LEGEND: ① CATCH BASIN FILTER ASSEMBLY (TYPE 1)

STATE OF VERMONT AGENCY OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 1) SLIPCOVER DETAILS

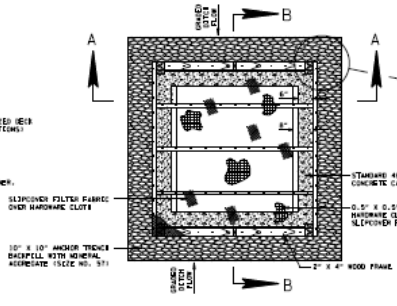
4-15-04 EC-STR-41A



ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY

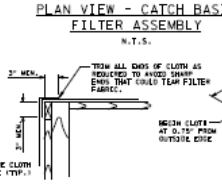
N.T.S.

CATCH BASIN TYPE	
39S	36SB
48S	41SB
12S	42SB
24SB	



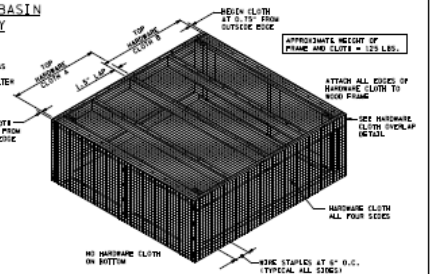
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY

N.T.S.



HARDWARE CLOTH OVERLAP DETAIL

N.T.S.



ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH

N.T.S.

EROSION CONTROL PLAN LEGEND: ② CATCH BASIN FILTER ASSEMBLY (TYPE 2)

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

(A) DRAWING TO BE USED WITH STANDARD TYPE 39S AND 2-CB-SERIES SB CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.

(B) THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED BEFORE INTERCEPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.

(C) 2 × 4 AND 4 × 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 × 3.5 INCH AND 3.5 × 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.

(D) PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)

(E) DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST BE GIVEN BY TOOT ENGINEER.

(F) ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.

(G) IF NECESSARY, AT DIRECTION OF TOOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.

(H) WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC...OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.

(I) ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.42, CATCH BASIN FILTER ASSEMBLY (TYPE 2), PER EACH.

INSTALLATION SEQUENCE FOR HARDWARE CLOTH

INSTALL TOP HARDWARE CLOTH A, PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A AT CENTER TOP BRACE. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

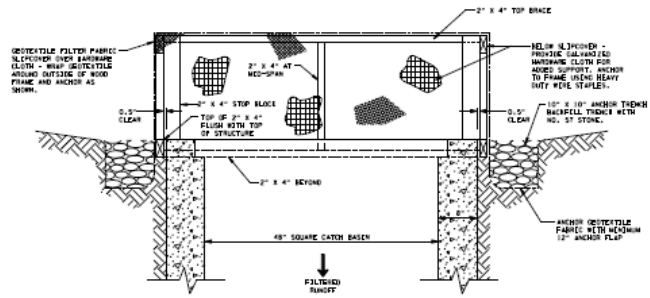
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.

TRIM EXCESS ALONG BOTTOM AS NECESSARY.

STATE OF VERMONT AGENCY OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 2)

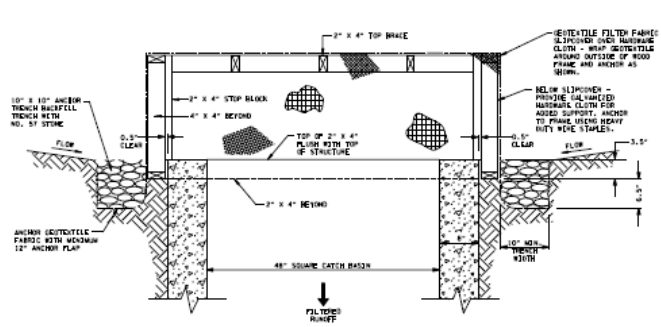
4-15-04 EC-STR-42



SECTION A-A
N.T.S.

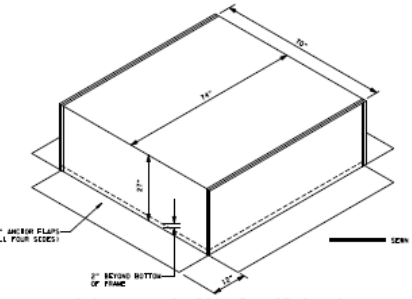
SLIPCOVER FILTER SPECIFICATIONS		
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE		
FABRIC PROPERTY	ASTM TEST METHOD	MINIMUM AVERAGE ROLL VALUES (MARV'S)
GRAB TENSILE STRENGTH	ASTM D4632	180 LBS
GRAB ELONGATION	ASTM D4632	>50%
MULLEN BURST	ASTM D3786	330 PSI
PUNCTURE STRENGTH	ASTM D4833	105 LBS
TRAPEZOIDAL TEAR	ASTM D4533	75 LBS
APPARENT OPENING SIZE (AOS)	ASTM D4751	FINER THAN OR EQUAL TO #80 U.S. STANDARD SIEVE
PERMEABILITY	ASTM D4491	0.12 CM/SEC/SEC
PERMITTIVITY	ASTM D4491	1.5 SEC^{-1}
WATER FLUX	ASTM D4491	110 GAL/MIN/FT^2
UV RESISTANCE	ASTM D4355	70% AT 500 HOURS
WEIGHT	ASTM D5776	MINIMUM 6 OZ/YD^2

HARDWARE CLOTH SPECIFICATIONS	
STANDARD SPECIFICATION	ASTM A740
OPENING SIZE	0.5 INCH X 0.5 INCH
WIRE SIZE	19 GAUGE
WIRE DIAMETER	0.041 INCHES
WEIGHT	≈ 0.2 LBS/SF
GRADE	LOW CARBON STEEL (C1008)
TYPE	WELDED HOT GALVANIZED STEEL WIRE FABRIC



SECTION B-B
N.T.S.

EROSION CONTROL PLAN LEGEND: ② CATCH BASIN FILTER ASSEMBLY (TYPE 2)



GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.

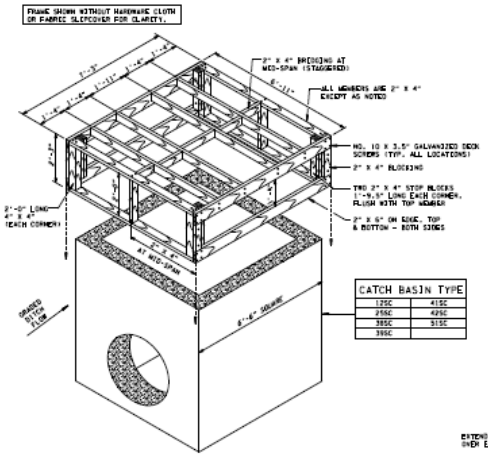
FABRICATION SPECIFICATIONS:

1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO CONCURRENT ROWS OF LOCK-TYPE STITCHING, USING UV-RESISTANT POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF 3.5 STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.

STATE OF VERMONT AGENCY OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 2) SLIPCOVER DETAILS

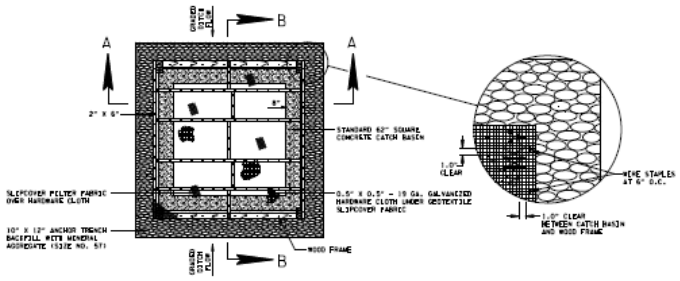
4-15-04 EC-STR-42A



CATCH BASIN TYPE	
12SC	41SC
24SC	42SC
36SC	51SC
39SC	

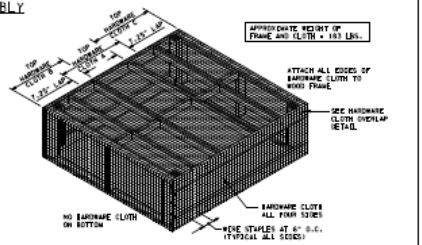
ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY
N.T.S.

EROSION CONTROL PLAN LEGEND: ③ CATCH BASIN FILTER ASSEMBLY (TYPE 3)



PLAN VIEW - CATCH BASIN FILTER ASSEMBLY
N.T.S.

HARDWARE CLOTH OVERLAP DETAIL
N.T.S.



ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH
N.T.S.

INSTALLATION SEQUENCE FOR HARDWARE CLOTH

INSTALL TOP HARDWARE CLOTH A - PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH B – OVERLAPPING CLOTH A AT SECOND TOP BRACE. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

INSTALL TOP HARDWARE CLOTH C – OVERLAPPING CLOTH A AT THIRD TOP BRACE. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.

TRIM EXCESS ALONG BOTTOM AS NECESSARY.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

(A) DRAWING TO BE USED WITH STANDARD TYPE B-(R)-SERIES SC CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.

(B) THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.

(C) 2 x 4, 2 x 6, AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH, 1.5 x 5.5 INCH, AND 3.5 x 3.5 INCH, RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.

(D) PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

(E) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION AND REMOVAL OF THE FILTER ASSEMBLY.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)

(F) REPETITIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO INSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST BE GIVEN BY TDOT ENGINEER.

(G) ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.

(H) IF NECESSARY, AT DIRECTION OF TDOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.

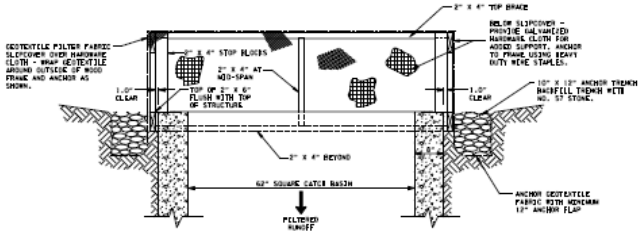
(I) WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES (IF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC...OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.

(J) ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.43, CATCH BASIN FILTER ASSEMBLY (TYPE 3), PER EACH.

STATE OF VERMONT AGENCY OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 3)

4-15-04 EC-STR-43

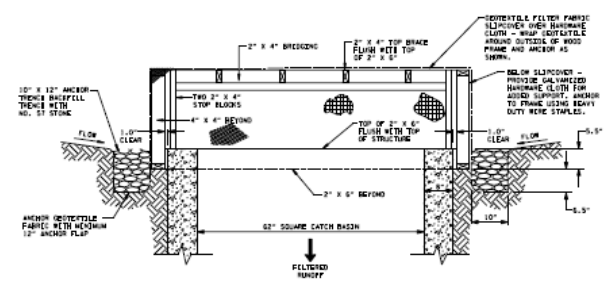


SECTION A-A

N.T.S.

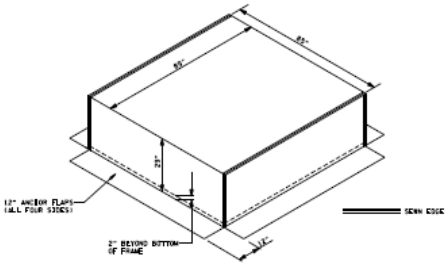
SLIPCOVER FILTER SPECIFICATIONS		
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE		
FABRIC PROPERTY	ASTM TEST METHOD	MINIMUM AVERAGE ROLL VALUES (MARV's)
GRAB TENSILE STRENGTH	ASTM D4632	≥180 LBS
GRAB ELONGATION	ASTM D4632	≥50%
MULLEN BURST	ASTM D3786	≥330 PSI
PUNCTURE STRENGTH	ASTM D4833	≥105 LBS
TRAPEZOIDAL TEAR	ASTM D4533	≥75 LBS
APPARENT OPENING SIZE (AOS)	ASTM D4751	FINER THAN OR EQUAL TO 400 U.S. STANDARD SIEVE
PERMEABILITY	ASTM D4491	≥0.02 INCHES/SEC
PERMITTIVITY	ASTM D4491	≥1.5 SEC^{-1}
WATER FLUX	ASTM D4491	≥110 GAL/MIN/FT^2
UV RESISTANCE	ASTM D4355	≥70% AT 500 HOURS
WEIGHT	ASTM D3776	MINIMUM 6 OZ/YD^2

HARDWARE CLOTH SPECIFICATIONS	
STANDARD SPECIFICATION	ASTM A740
OPENING SIZE	0.5 INCH X 0.5 INCH
WIRE SIZE	19 GAUGE
WIRE DIAMETER	0.041 INCHES
WEIGHT	≈ 0.42 LBS/SF
GRADE	LOW CARBON STEEL (CLOSED)
TYPE	WELDED HOT GALVANIZED STEEL WIRE FABRIC



SECTION B-B

N.T.S.



GEOTEXTILE SLIPCOVER FABRICATION

N.T.S.

FABRICATION SPECIFICATIONS:

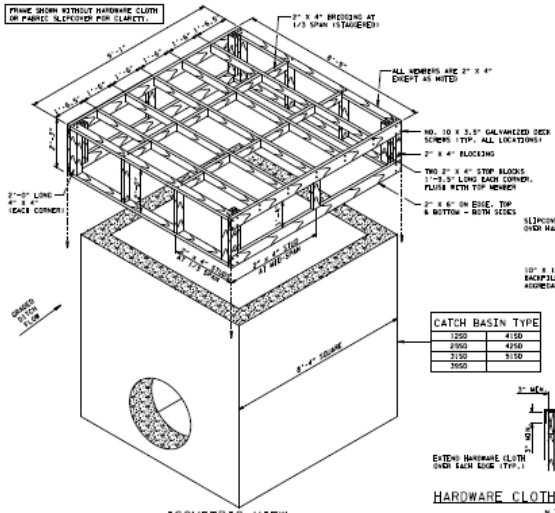
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO INDEPENDENT ROWS OF LOCK-TYPE STITCHING, USING UV-BONDED POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF SIX STITCHES PER INCH.
3. THE OUTSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.

EROSION CONTROL PLAN LEGEND: ③ CATCH BASIN FILTER ASSEMBLY (TYPE 3)

STATE OF VERMONT AGENCY OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 3) SLIPCOVER DETAILS

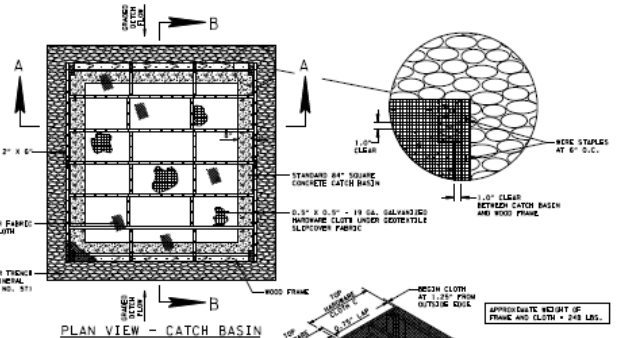
4-15-04 EC-STR-43A



ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY

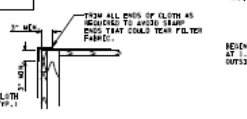
N.T.S.

CATCH BASIN TYPE	
1250	4150
2550	4250
3150	5150
3550	



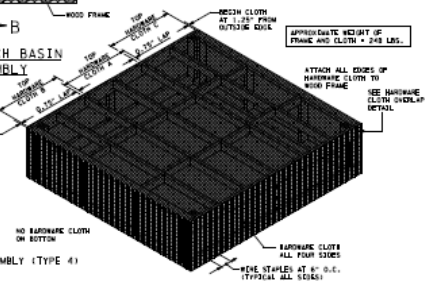
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY

N.T.S.



HARDWARE CLOTH OVERLAP DETAIL

N.T.S.



ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH

N.T.S.

EROSION CONTROL PLAN LEGEND: ④ CATCH BASIN FILTER ASSEMBLY (TYPE 4)

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

A. DRAWING TO BE USED WITH STANDARD TYPE D-CB-SERIES SO CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.

B. THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.

C. 2 x 4, 2 x 6, AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH, 1.5 x 5.5 INCH, AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.

D. PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

E. APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION AND REMOVAL OF THE FILTER ASSEMBLY.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)

F. DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST BE GIVEN BY THE ENGINEER.

G. ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.

H. IF NECESSARY, AT DIRECTION OF THE ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.

I. WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC....OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.

J. ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 208-40.44, CATCH BASIN FILTER ASSEMBLY (TYPE 4), PER EACH.

INSTALLATION SEQUENCE FOR HARDWARE CLOTH

INSTALL TOP HARDWARE CLOTH A ACROSS CENTER OF FRAME. PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A AT SECOND TOP BRACE. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

INSTALL TOP HARDWARE CLOTH C - OVERLAPPING CLOTH A AT FOURTH TOP BRACE. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

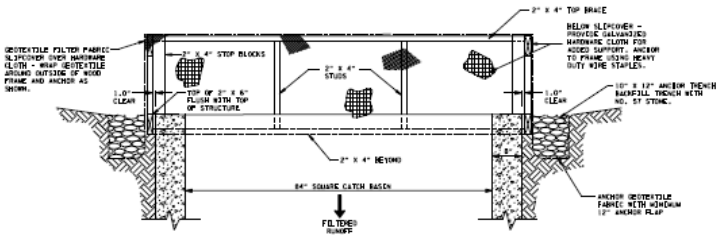
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.

TRIM EXCESS ALONG BOTTOM AS NECESSARY.

STATE OF VERMONT AGENCY OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 4)

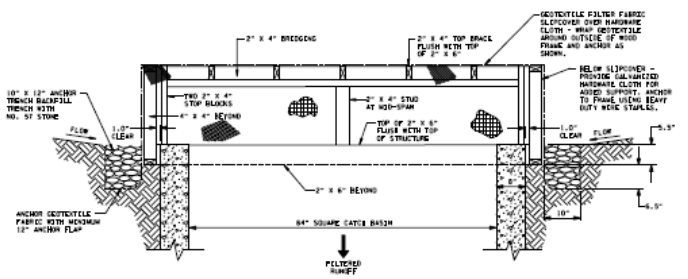
4-15-04 EC-STR-44



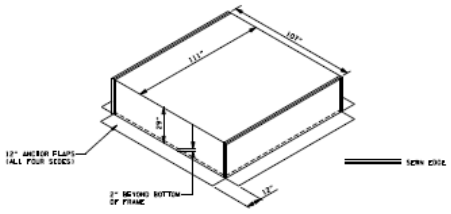
SECTION A-A
N.T.S.

SLIPCOVER FILTER SPECIFICATIONS		
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE		
FABRIC PROPERTY	ASTM TEST METHOD	MINIMUM AVERAGE ROLL VALUES (MARV'S)
GRAB TENSILE STRENGTH	ASTM D4632	180 LBS
GRAB ELONGATION	ASTM D4632	50%
MULLEN BURST	ASTM D3786	330 PSI
PUNCTURE STRENGTH	ASTM D4833	105 LBS
TRAPEZOIDAL TEAR	ASTM D4533	75 LBS
APPARENT OPENING SIZE (AOS)	ASTM D4751	FINER THAN OR EQUAL TO #80 U.S. STANDARD SIEVE
PERMEABILITY	ASTM D4491	.10 CM/SEC/SEC
PERMITTIVITY	ASTM D4491	.21/S SEC^{-1}
WATER FLUX	ASTM D4491	110 GAL/MIN/FT^2
UV RESISTANCE	ASTM D4355	70% AT 500 HOURS
WEIGHT	ASTM D3776	MINIMUM 6 OZ/YD^2

HARDWARE CLOTH SPECIFICATIONS	
STANDARD SPECIFICATION	ASTM A740
OPENING SIZE	0.5 INCH X 0.5 INCH
WIRE SIZE	19 GAUGE
WIRE DIAMETER	0.041 INCHES
WEIGHT	≥ 0.2 LBS/SF
GRADE	LOW CARBON STEEL (C1008)
TYPE	WELDED HOT GALVANIZED STEEL WIRE FABRIC



SECTION B-B
N.T.S.



GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.

FABRICATION SPECIFICATIONS:

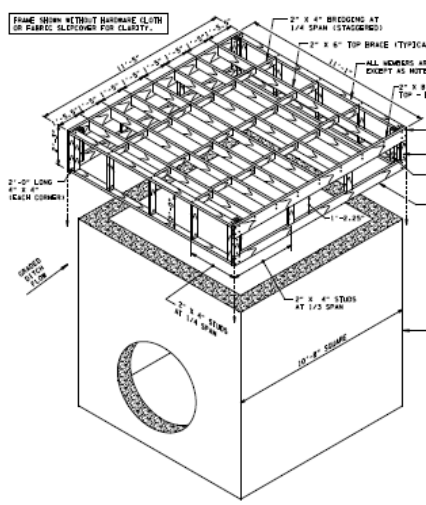
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC ENDS FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO INDEPENDENT ROWS OF LOCK-TYPE STITCHING, USING UV-BONDED POLYESTER THREAD (MINIMUM OF 130 POUNDS) WITH MINIMUM OF 5.5 STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.

EROSION CONTROL PLAN LEGEND: ④ CATCH BASIN FILTER ASSEMBLY (TYPE 4)

STATE OF VERMONT AGENCY OF TRANSPORTATION

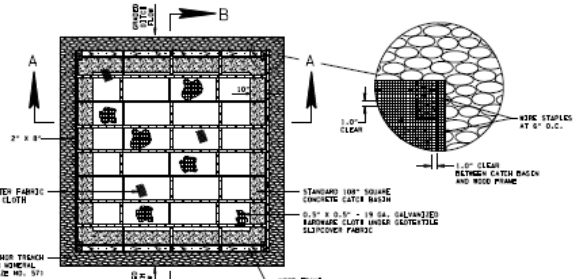
CATCH BASIN FILTER ASSEMBLY (TYPE 4) SLIPCOVER DETAILS

4-15-04 EC-STR-44A

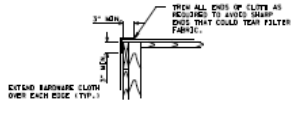


ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY
N.T.S.

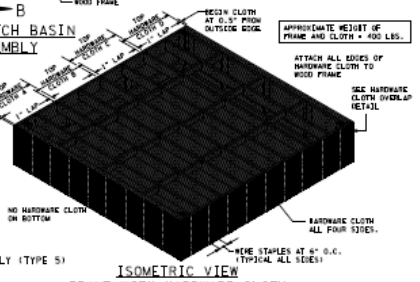
CATCH BASIN TYPE	
12SE	39SE
14SE	41SE
25SE	44SE
31SE	46SE



PLAN VIEW - CATCH BASIN FILTER ASSEMBLY
N.T.S.



HARDWARE CLOTH OVERLAP DETAIL
N.T.S.



ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH
N.T.S.

EROSION CONTROL PLAN LEGEND: ⑤ CATCH BASIN FILTER ASSEMBLY (TYPE 5)

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

(A) DRAWING TO BE USED WITH STANDARD TYPE D-(C)-(SERIES) SE CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.

(B) THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. SYSTEMS AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.

(C) 2 x 4, 2 x 6, 2 x 8, AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH, 1.5 x 5.5 INCH, 1.5 x 7.25 INCH, AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.

(D) PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

(E) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION AND REMOVAL OF THE FILTER ASSEMBLY.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)

(F) DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO INSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST BE GIVEN BY THE ENGINEER.

(G) ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.

(H) IF NECESSARY, AT DIRECTION OF THE ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.

(I) WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC...OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.

(J) ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING THICKENING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209.40.45, CATCH BASIN FILTER ASSEMBLY (TYPE 5), PER EACH.

INSTALLATION SEQUENCE FOR HARDWARE CLOTH

INSTALL TOP HARDWARE CLOTH A. PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A AT SECOND TOP BRACE. PULL MATERIAL TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH C - OVERLAPPING CLOTH B AT FOURTH TOP BRACE. PULL MATERIAL TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH D - OVERLAPPING CLOTH C AT SIXTH TOP BRACE. PULL MATERIAL TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

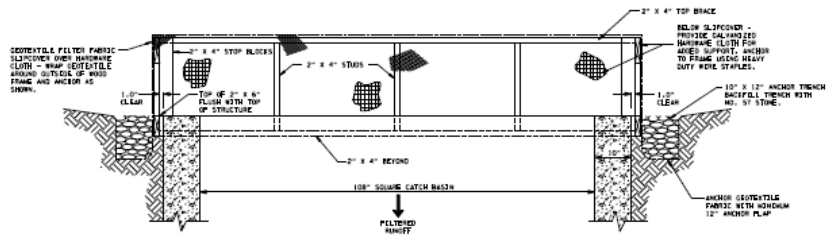
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.

TRIM EXCESS ALONG BOTTOM AS NECESSARY.

STATE OF VERMONT AGENCY OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 5)

4-15-04 EC-STR-45

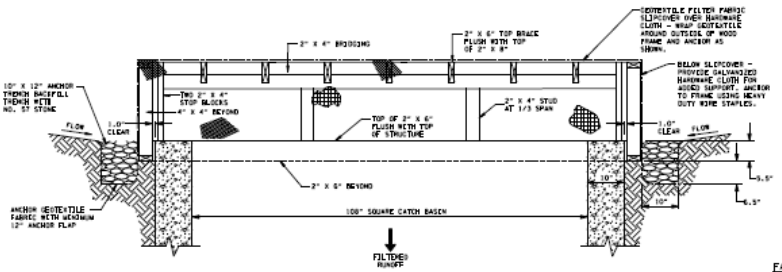


SECTION A-A

N.T.S.

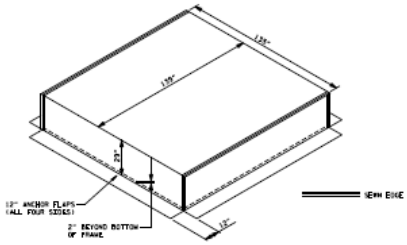
SLIPCOVER FILTER SPECIFICATIONS		
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE		
FABRIC PROPERTY	ASTM TEST METHOD	MINIMUM AVERAGE ROLL VALUES (MARVS)
GRAB TENSILE STRENGTH	ASTM D4632	≥180 LBS
GRAB ELONGATION	ASTM D4632	≥50%
MULLEN BURST	ASTM D3786	≥350 PSI
PUNCTURE STRENGTH	ASTM D4833	≥105 LBS
TRAPEZOIDAL TEAR	ASTM D4533	≥75 LBS
APPARENT OPENING SIZE (AOS)	ASTM D4751	FINER THAN OR EQUAL TO #80 U.S. STANDARD SIEVE
PERMEABILITY	ASTM D4491	≥0.12 INCHES/SEC
PERMITTIVITY	ASTM D4491	≥1.5 SEC^{-1}
WATER FLUX	ASTM D4491	≥220 GAL/MIN/FT^2
UV RESISTANCE	ASTM D4355	≥70% AT 500 HOURS
WEIGHT	ASTM D3776	MINIMUM 6 OZ/YD^2

HARDWARE CLOTH SPECIFICATIONS	
STANDARD SPECIFICATION	ASTM A740
OPENING SIZE	0.5 INCH X 0.5 INCH
WIRE SIZE	19 GAUGE
WIRE DIAMETER	0.041 INCHES
WEIGHT	4 OZ LBS/SF
GRADE	LOW CARBON STEEL (G1008)
TYPE	WELDED HOT GALVANIZED STEEL WIRE FABRIC



SECTION B-B

N.T.S.



GEOTEXTILE SLIPCOVER FABRICATION

N.T.S.

FABRICATION SPECIFICATIONS:

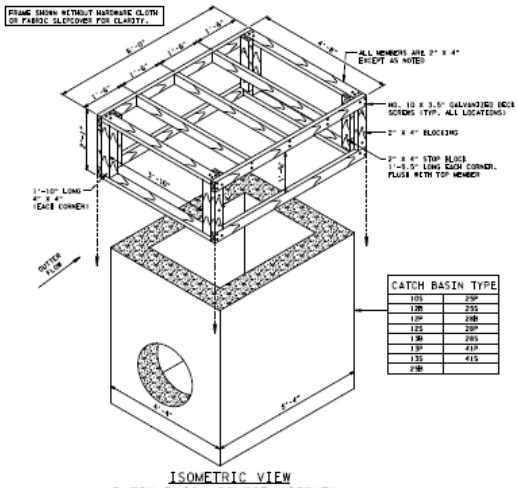
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO INDEPENDENT ROWS OF LOCK-TYPE STITCHING, USING UV-BONDED POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF 5.5 STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.

EROSION CONTROL PLAN LEGEND: ⑤ CATCH BASIN FILTER ASSEMBLY (TYPE 5)

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

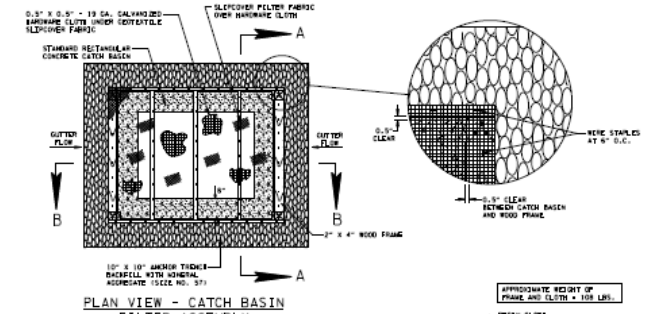
CATCH BASIN FILTER ASSEMBLY (TYPE 5) SLIPCOVER DETAILS

4-15-04 EC-STR-45A



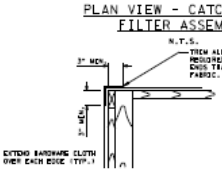
ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY

N.T.S.



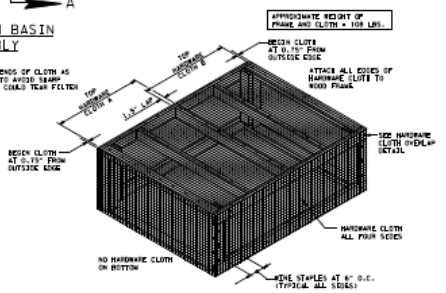
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY

N.T.S.



HARDWARE CLOTH OVERLAP DETAIL

N.T.S.



ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH

N.T.S.

EROSION CONTROL PLAN LEGEND: ⑥ CATCH BASIN FILTER ASSEMBLY (TYPE 6)

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

(A) DRAWING TO BE USED WITH STANDARD TYPES 105, 41P, 41S AND 24B-SERIES B.P. OR S FOR TYPE 12, 13, 25, AND 28 CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.

(B) THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.

(C) 2 x 4 AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.

(D) PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)

(E) DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST BE GIVEN BY TDOT ENGINEER.

(F) ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.

(G) IF NECESSARY, AT DIRECTION OF TDOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.

(H) WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC...OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.

(I) ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.46, CATCH BASIN FILTER ASSEMBLY (TYPE 6), PER EACH.

INSTALLATION SEQUENCE FOR HARDWARE CLOTH

INSTALL TOP HARDWARE CLOTH A. PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A AT CENTER TOP BRACE. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

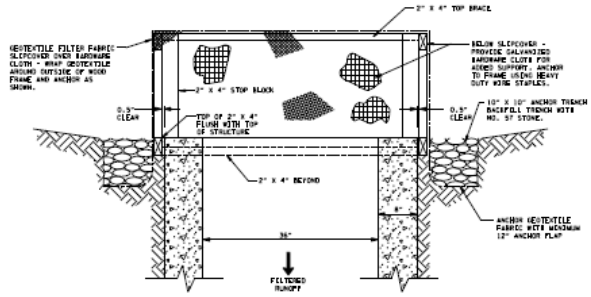
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.

TRIM EXCESS ALONG BOTTOM AS NECESSARY.

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 6)

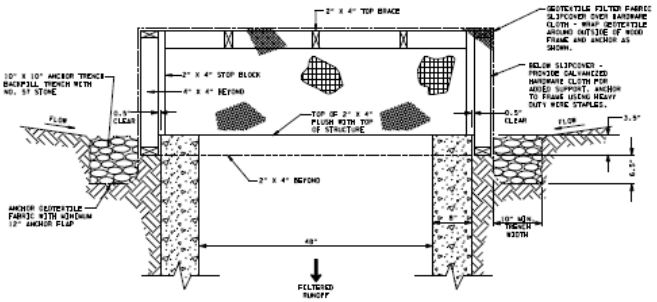
4-15-04 EC-STR-46



SECTION A-A
N.T.S.

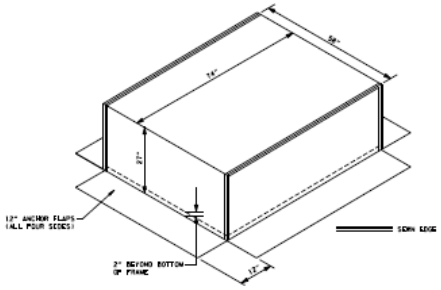
SLIPCOVER FILTER SPECIFICATIONS		
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE		
FABRIC PROPERTY	ASTM TEST METHOD	MINIMUM AVERAGE ROLL VALUES (MARV'S)
GRAB TENSILE STRENGTH	ASTM D4632	≥180 LBS
GRAB ELONGATION	ASTM D4632	≥50%
MULLEN BURST	ASTM D3786	≥330 PSI
PUNCTURE STRENGTH	ASTM D4833	≥105 LBS
TRAPEZOIDAL TEAR	ASTM D4533	≥75 LBS
APPARENT OPENING SIZE (AOS)	ASTM D4751	FINER THAN OR EQUAL TO #80 U.S. STANDARD SIEVE
PERMEABILITY	ASTM D4491	≥0.12 INCHES/SEC
PERMITTIVITY	ASTM D4491	≥1.5 SEC^{-1}
WATER FLUX	ASTM D4491	≥110 GAL/MIN/FT^2
UV RESISTANCE	ASTM D4355	≥70% AT 500 HOURS
WEIGHT	ASTM D3776	MINIMUM 6 OZ/YD^2

HARDWARE CLOTH SPECIFICATIONS	
STANDARD SPECIFICATION	ASTM A740
OPENING SIZE	0.5 INCH X 0.5 INCH
WIRE SIZE	19 GAUGE
WIRE DIAMETER	0.041 INCHES
WEIGHT	≈ 0.2 LBS/SF
GRADE	LOW CARBON STEEL (C1008)
TYPE	WELDED HOT GALVANIZED STEEL WIRE FABRIC



SECTION B-B
N.T.S.

EROSION CONTROL PLAN LEGEND: ⑥ CATCH BASIN FILTER ASSEMBLY (TYPE 6)



GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.

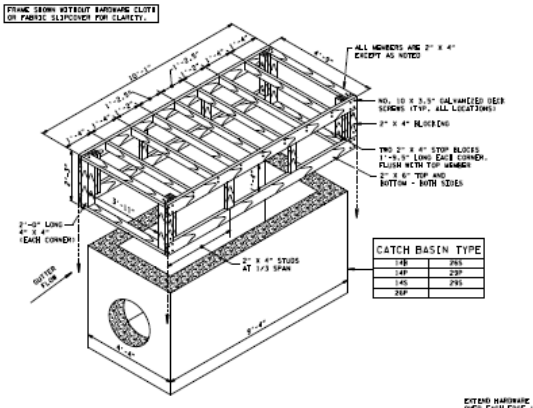
FABRICATION SPECIFICATIONS:

1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FINISHED FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO INDEPENDENT ROWS OF LOCK-TYPE STITCHING, USING UV-BONDED POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF SIX STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.

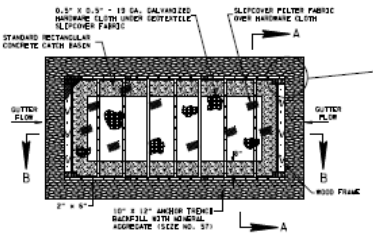
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

CATCH BASIN FILTER ASSEMBLY (TYPE 6) SLIPCOVER DETAILS

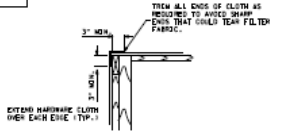
4-15-04 EC-STR-46A



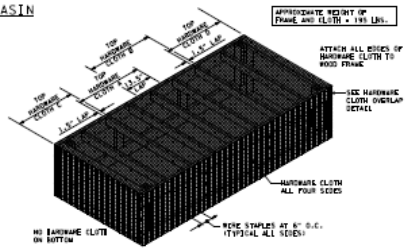
ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY
N.T.S.



PLAN VIEW - CATCH BASIN FILTER ASSEMBLY
N.T.S.



HARDWARE CLOTH OVERLAP DETAIL
N.T.S.



ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH
N.T.S.

EROSION CONTROL PLAN LEGEND: ⑦ CATCH BASIN FILTER ASSEMBLY (TYPE 7)

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES

(A) DRAWING TO BE USED WITH STANDARD TYPES 14B AND D-CB-SERIES P & S FOR TYPE 14, 26 AND 29 CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.

(B) THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.

(C) 2 x 4, 2 x 6 AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH, 1.5 x 5.5 INCH AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.

(D) PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.

(E) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION AND REMOVAL OF THE FILTER ASSEMBLY.

CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)

(F) DEPENDING MODEL, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST GIVEN BY THE ENGINEER.

(G) ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.

(H) IF NECESSARY, AT DIRECTION OF TDOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.

(I) WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC...OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.

(J) ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.47, CATCH BASIN FILTER ASSEMBLY (TYPE 7), PER EACH.

INSTALLATION SEQUENCE FOR HARDWARE CLOTH

INSTALL TOP HARDWARE CLOTH A. PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.

INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A 13.5 INCHES. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

INSTALL TOP HARDWARE CLOTH C - OVERLAPPING CLOTH A. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

INSTALL TOP HARDWARE CLOTH D - OVERLAPPING CLOTH B. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.

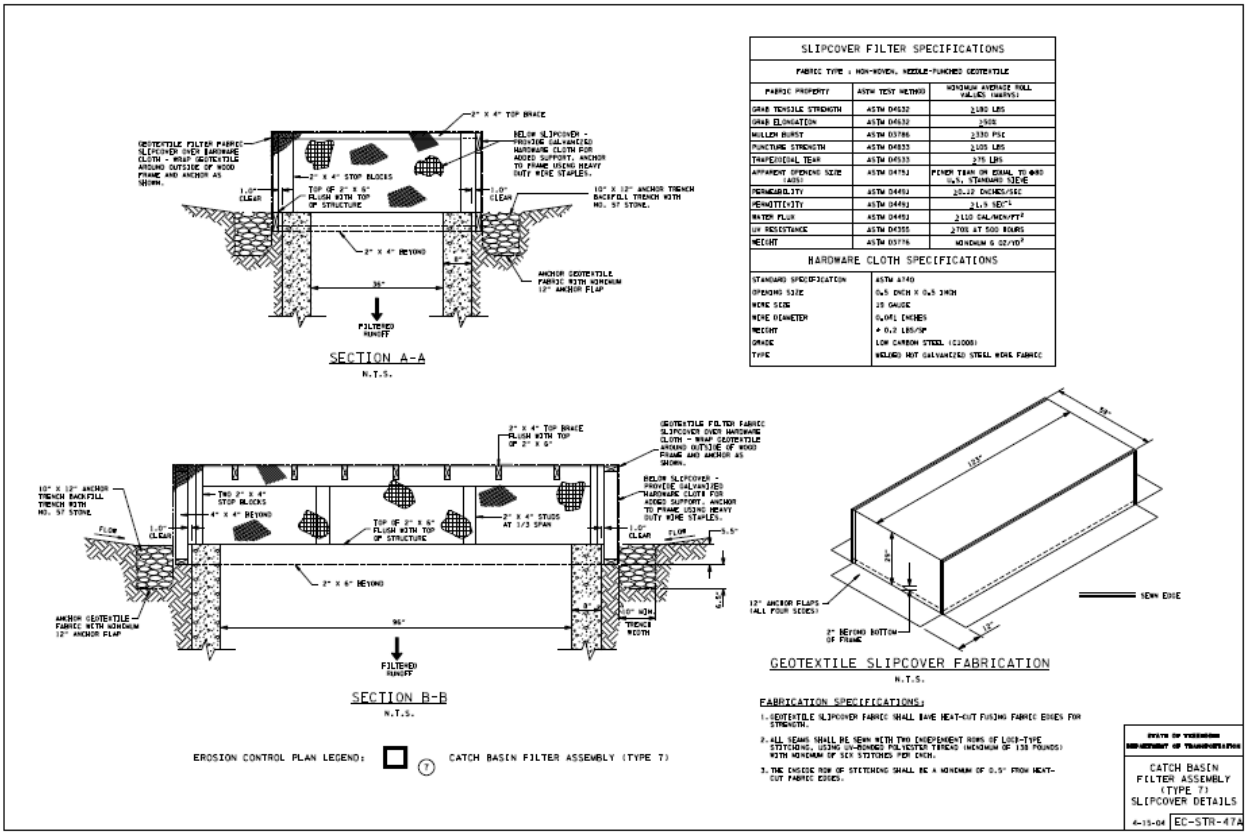
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.

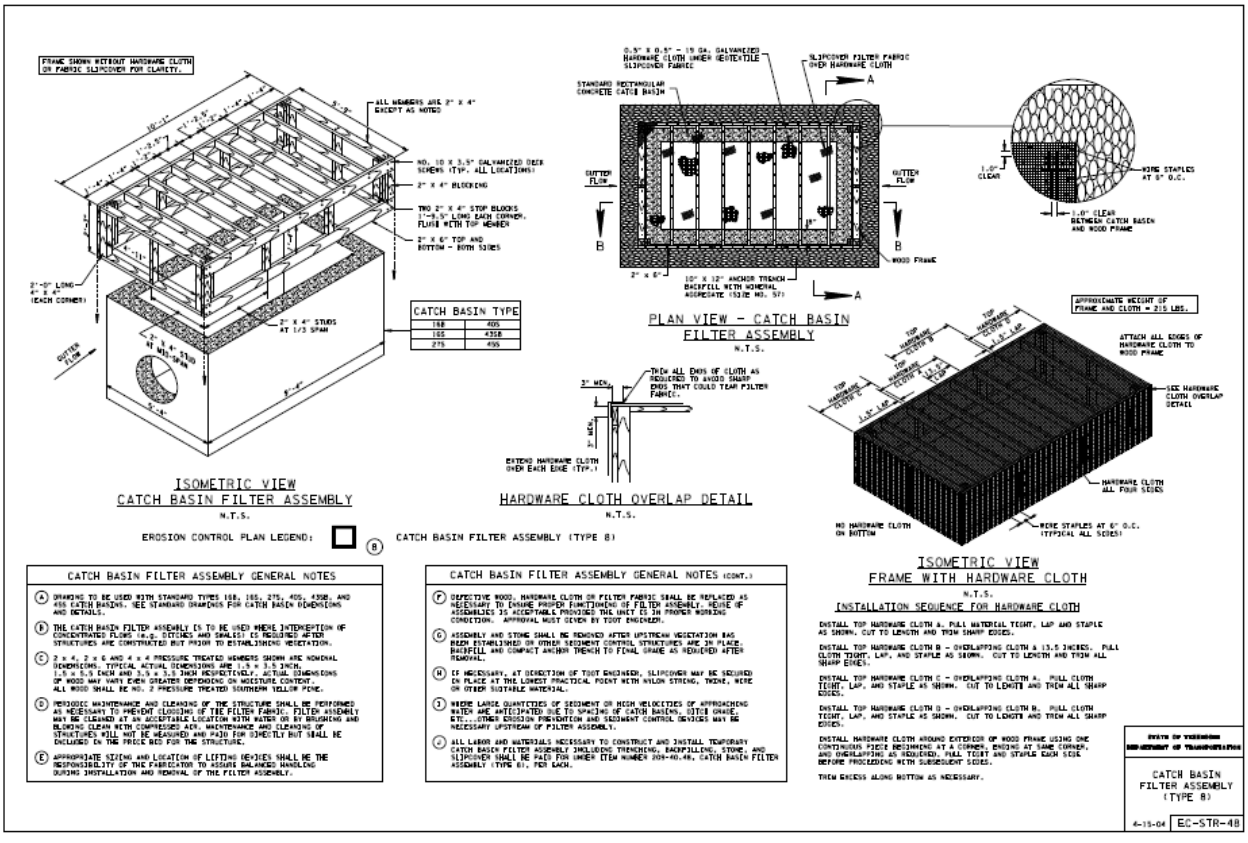
TRIM EXCESS ALONG BOTTOM AS NECESSARY.

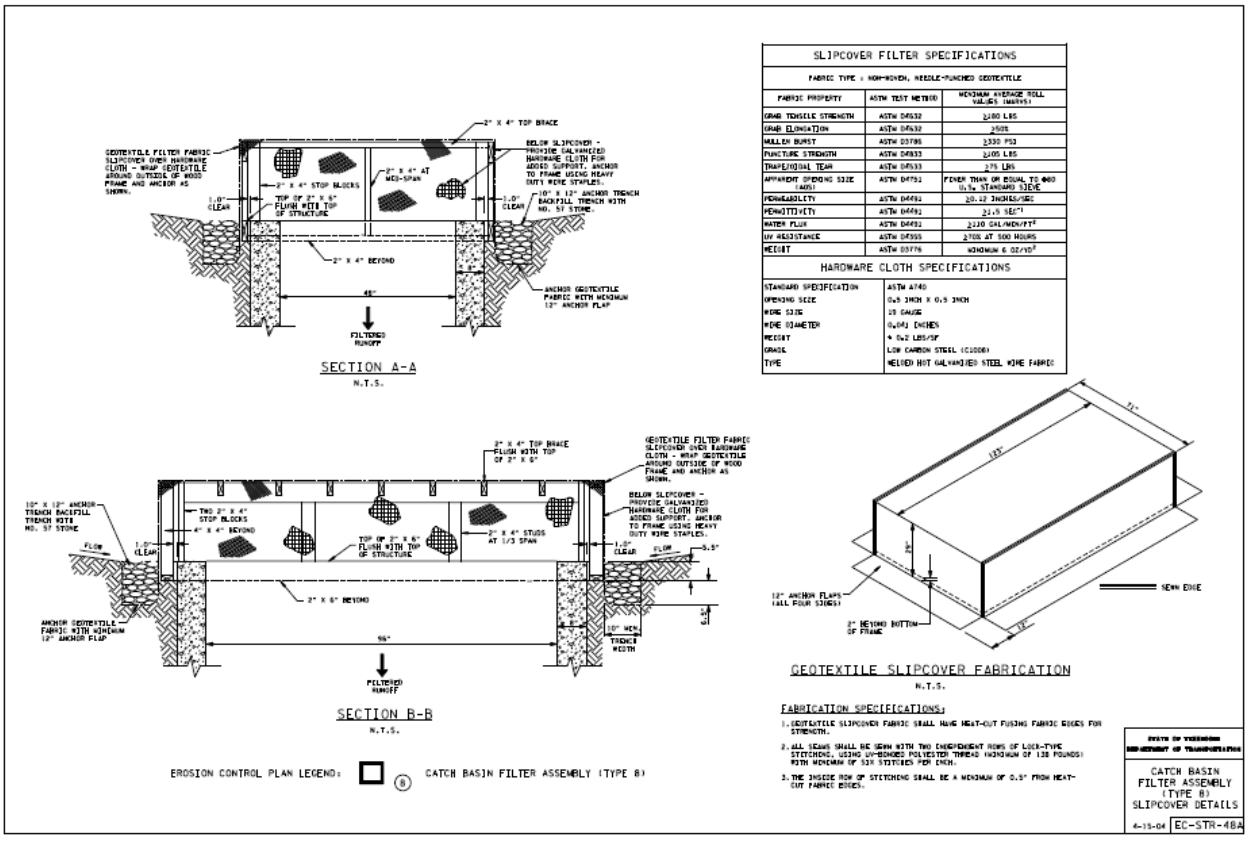
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

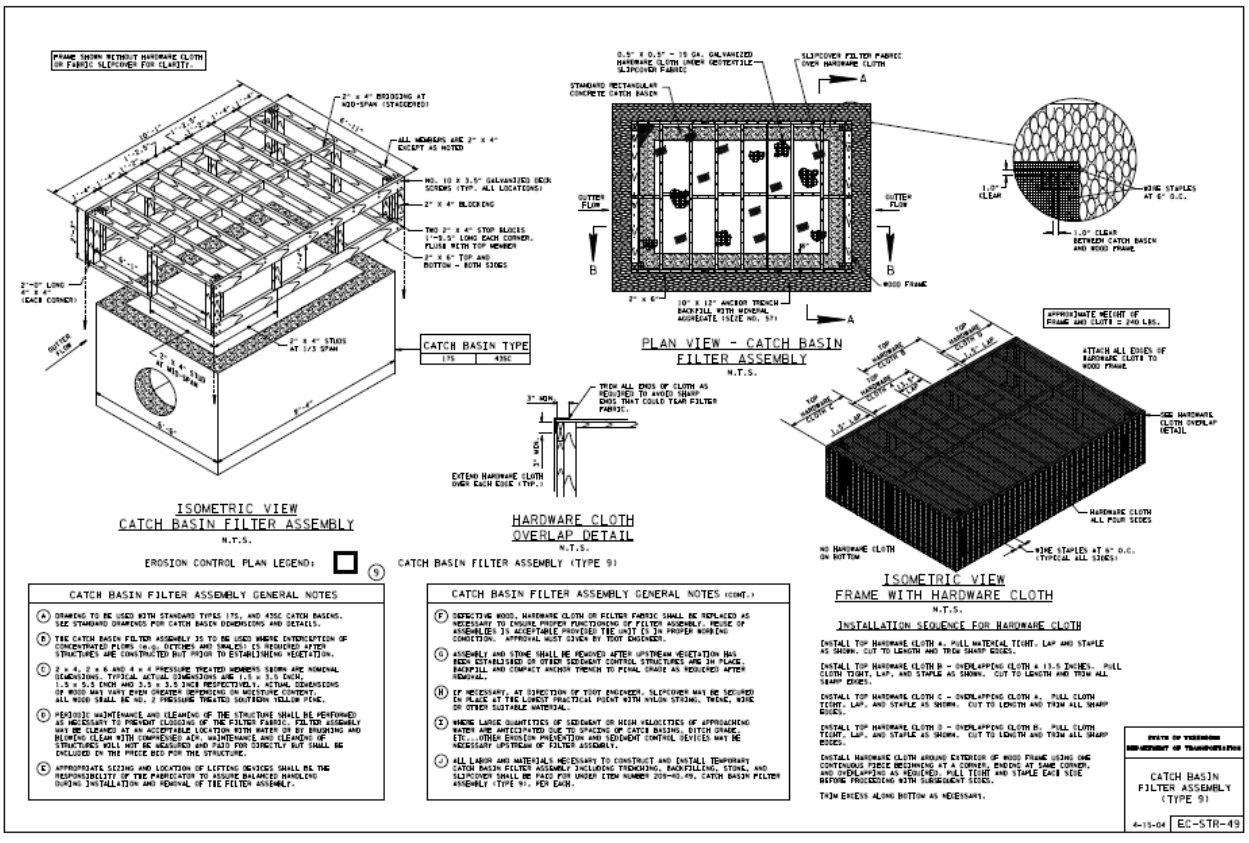
CATCH BASIN FILTER ASSEMBLY (TYPE 7)

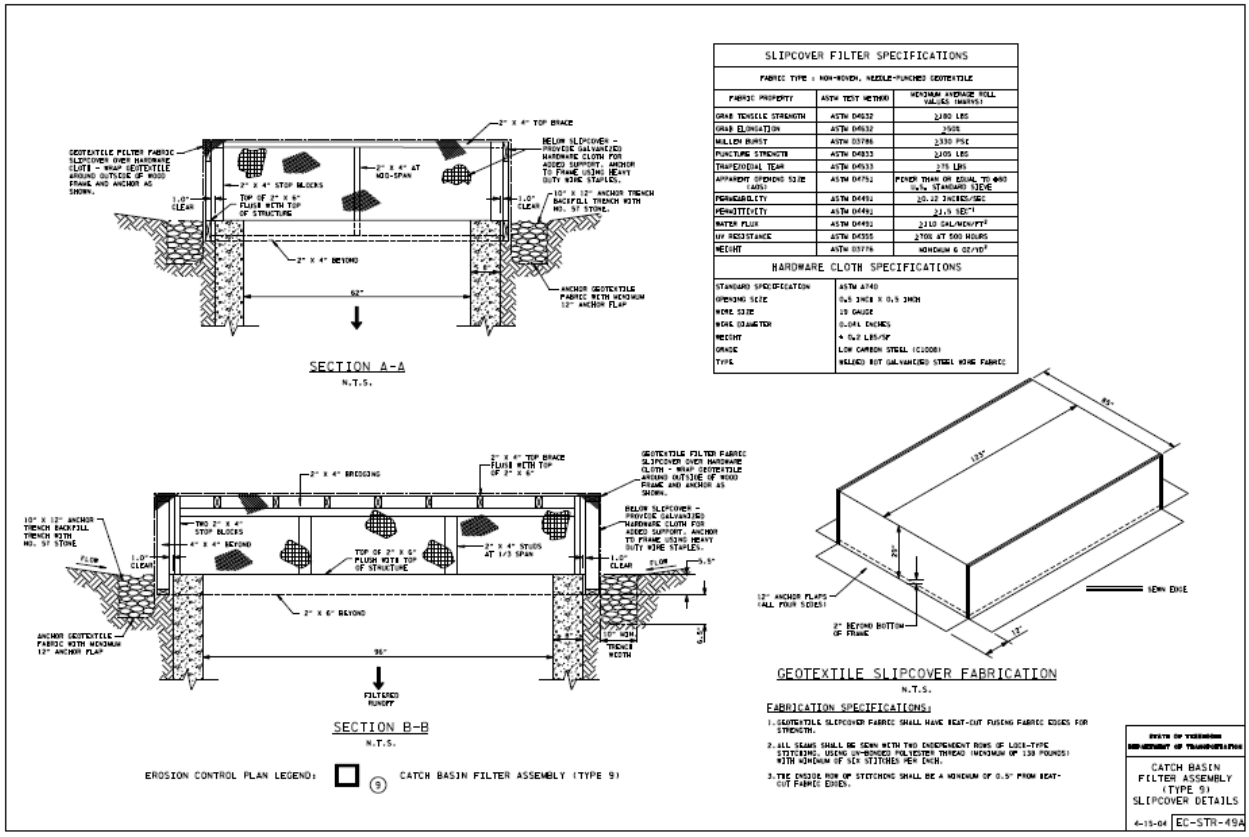
4-15-04 EC-STR-47

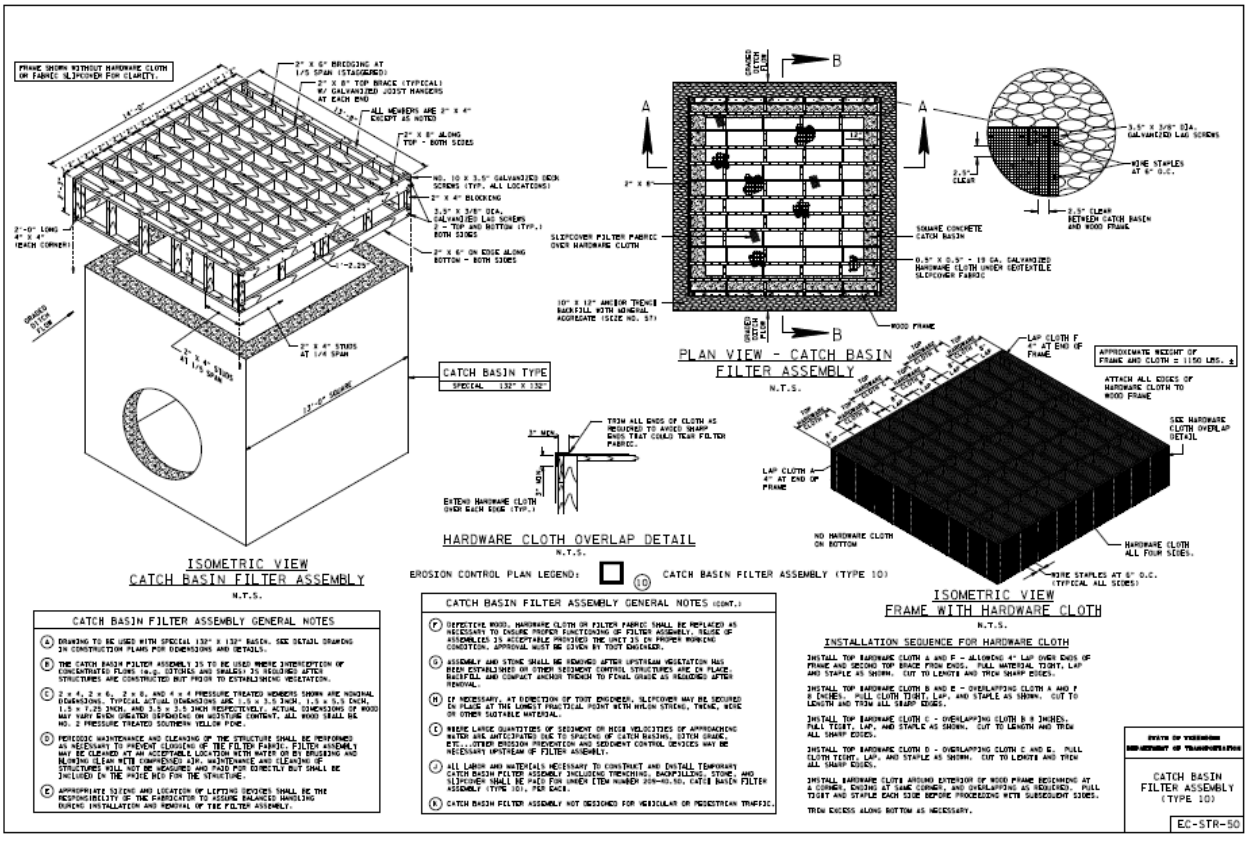

2" X 4" TOP BRACE
GEOTEXTILE FILTER FABRIC SLIPCOVER OVER HARDWARE CLOTH - WRAP GEOTEXTILE AROUND OUTSIDE OF WOOD FRAME AND ANCHOR AS SHOWN.
BELOW SLIPCOVER - PROVIDE GALVANIZED HARDWARE CLOTH FOR ADDED SUPPORT. ANCHOR TO FRAME USING HEAVY DUTY WIRE STAPLES.
2" X 4" STOP BLOCKS
1.0" CLEAR
TOP OF 2" X 6" FLUSH WITH TOP OF STRUCTURE
10" X 12" ANCHOR TRENCH BACKFILL TRENCH WITH NO. 57 STONE.
2" X 4" BEYOND
ANCHOR GEOTEXTILE FABRIC WITH MINIMUM 12" ANCHOR FLAP
FILTERED RUNOFF
SECTION A-A
N.T.S.
SLIPCOVER FILTER SPECIFICATIONS
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE
FABRIC PROPERTY | ASTM TEST METHOD | MINIMUM AVERAGE ROLL VALUES (MARV'S)
GRAB TENSILE STRENGTH | ASTM D4632 | ≥180 LBS
GRAB ELONGATION | ASTM D4632 | ≥50%
MULLEN BURST | ASTM D3786 | ≥330 PSI
PUNCTURE STRENGTH | ASTM D4833 | ≥105 LBS
TRAPEZOIDAL TEAR | ASTM D4533 | ≥75 LBS
APPARENT OPENING SIZE (AOS) | ASTM D4751 | FINER THAN OR EQUAL TO #80 U.S. STANDARD SIEVE
PERMEABILITY | ASTM D4491 | ≥0.22 INCHES/SEC
PERMITTIVITY | ASTM D4491 | ≥1.5 SEC⁻¹
WATER FLUX | ASTM D4491 | ≥110 GAL/MIN/FT²
UV RESISTANCE | ASTM D4355 | ≥70% AT 500 HOURS
WEIGHT | ASTM D3776 | MINIMUM 6 OZ/YD²
HARDWARE CLOTH SPECIFICATIONS
STANDARD SPECIFICATION | ASTM A740
OPENING SIZE | 0.5 INCH X 0.5 INCH
WIRE SIZE | 19 GAUGE
WIRE DIAMETER | 0.041 INCHES
WEIGHT | ≥ 0.2 LBS/SF
GRADE | LOW CARBON STEEL (C1008)
TYPE | WELDED HOT GALVANIZED STEEL WIRE FABRIC
2" X 4" TOP BRACE FLUSH WITH TOP OF 2" X 6"
(GEOTEXTILE FILTER FABRIC SLIPCOVER OVER HARDWARE CLOTH - WRAP GEOTEXTILE AROUND OUTSIDE OF WOOD FRAME AND ANCHOR AS SHOWN.
BELOW SLIPCOVER - PROVIDE GALVANIZED HARDWARE CLOTH FOR ADDED SUPPORT. ANCHOR TO FRAME USING HEAVY DUTY WIRE STAPLES.
10" X 12" ANCHOR TRENCH BACKFILL TRENCH WITH NO. 57 STONE.
TWO 2" X 4" STOP BLOCKS
4" X 4" BEYOND
TOP OF 2" X 6" FLUSH WITH TOP OF STRUCTURE
2" X 4" STUDS AT 1/3 SPAN
FLOW
1.0" CLEAR
2" X 6" BEYOND
ANCHOR GEOTEXTILE FABRIC WITH MINIMUM 12" ANCHOR FLAP
FILTERED RUNOFF
SECTION B-B
N.T.S.
39"
123"
39"
SEWN EDGE
12" ANCHOR FLAPS (ALL FOUR SIDES)
2" BEYOND BOTTOM OF FRAME
GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.
FABRICATION SPECIFICATIONS:
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO ENDEMENT ROWS OF LOCK-TYPE STITCHING, USING UV-BONDED POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF SIX STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.
EROSION CONTROL PLAN LEGEND:
7
CATCH BASIN FILTER ASSEMBLY (TYPE 7)
STATE OF WASHINGTON DEPARTMENT OF TRANSPORTATION
CATCH BASIN FILTER ASSEMBLY (TYPE 7) SLIPCOVER DETAILS
4-15-04
EC-STR-47A

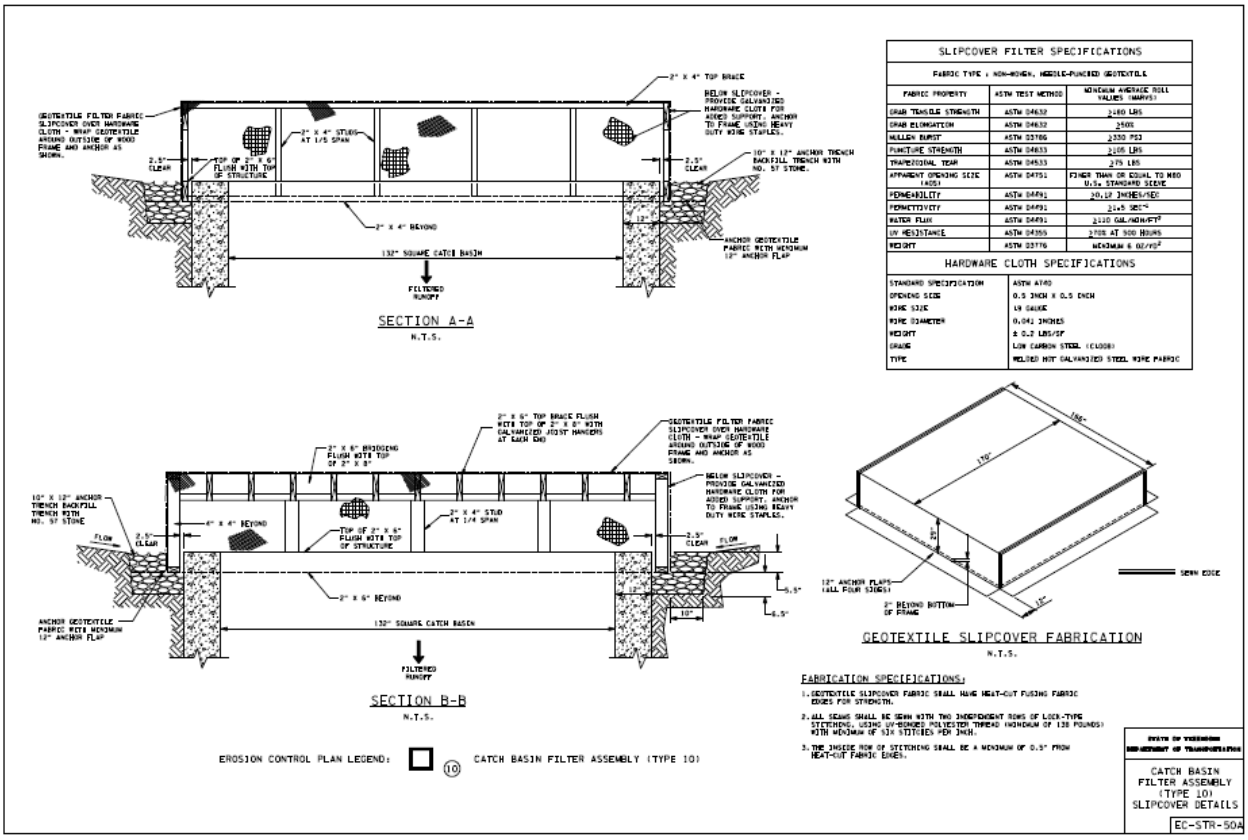

FRAME SHOWN WITHOUT HARDWARE CLOTH OR FABRIC SLIPCOVER FOR CLARITY.
ALL MEMBERS ARE 2" X 4" EXCEPT AS NOTED
NO. 10 X 3.5" GALVANIZED DECK SCREWS (TYP. ALL LOCATIONS)
2" X 4" BLOCKING
TWO 2" X 4" STOP BLOCKS 1'-6.5" LONG EACH CORNER, FLUSH WITH TOP MEMBER
2" X 6" TOP AND BOTTOM - BOTH SIDES
2'-0" LONG 4" X 4" (EACH CORNER)
2" X 4" STUDS AT 1/3 SPAN
GUTTER FLOW
CATCH BASIN TYPE
168 | 48S
185 | 435B
275 | 49S
ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY
N.T.S.
0.5" X 0.5" - 19 GA. GALVANIZED HARDWARE CLOTH UNDER GEOTEXTILE SLIPCOVER FABRIC
SLIPCOVER FILTER FABRIC OVER HARDWARE CLOTH
STANDARD RECTANGULAR CONCRETE CATCH BASIN
GUTTER FLOW
2" X 6"
WOOD FRAME
10" X 12" ANCHOR TRENCH BACKFILL WITH NOMINAL AGGREGATE (SIZE NO. 57)
1.0" CLEAR
WIRE STAPLES AT 6" O.C.
1.0" CLEAR BETWEEN CATCH BASIN AND WOOD FRAME
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY
N.T.S.
TRIM ALL ENDS OF CLOTH AS REQUIRED TO AVOID SHARP ENDS THAT COULD TEAR FILTER FABRIC.
3" MIN.
EXTEND HARDWARE CLOTH OVER EACH EDGE (TYP.)
HARDWARE CLOTH OVERLAP DETAIL
N.T.S.
APPROXIMATE WEIGHT OF FRAME AND CLOTH = 215 LBS.
TOP HARDWARE CLOTH B
TOP HARDWARE CLOTH A
TOP HARDWARE CLOTH C
1.5" LAP
ATTACH ALL EDGES OF HARDWARE CLOTH TO WOOD FRAME
SEE HARDWARE CLOTH OVERLAP DETAIL
HARDWARE CLOTH ALL FOUR SIDES
NO HARDWARE CLOTH ON BOTTOM
WIRE STAPLES AT 6" O.C. (TYPICAL ALL SIDES)
ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH
N.T.S.
EROSION CONTROL PLAN LEGEND:
8
CATCH BASIN FILTER ASSEMBLY (TYPE 8)
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES
(A) DRAWING TO BE USED WITH STANDARD TYPES 168, 185, 275, 49S, 435B, AND 49S CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.
(B) THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERRUPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.
(C) 2 x 4, 2 x 6 AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH, 1.5 x 5.5 INCH AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDENCE ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.
(D) PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.
(E) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION AND REMOVAL OF THE FILTER ASSEMBLY.
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)
(F) DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST GIVEN BY TDOT ENGINEER.
(G) ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.
(H) IF NECESSARY, AT DIRECTION OF TDOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.
(I) WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC....OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.
(J) ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.48, CATCH BASIN FILTER ASSEMBLY (TYPE 8), PER EACH.
[INSTALLATION SEQUENCE FOR HARDWARE CLOTH]
INSTALL TOP HARDWARE CLOTH A. PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.
INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A 13.5 INCHES. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL TOP HARDWARE CLOTH C - OVERLAPPING CLOTH A. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL TOP HARDWARE CLOTH D - OVERLAPPING CLOTH B. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.
TRIM EXCESS ALONG BOTTOM AS NECESSARY.
STATE OF WASHINGTON DEPARTMENT OF TRANSPORTATION
CATCH BASIN FILTER ASSEMBLY (TYPE 8)
4-15-04
EC-STR-48

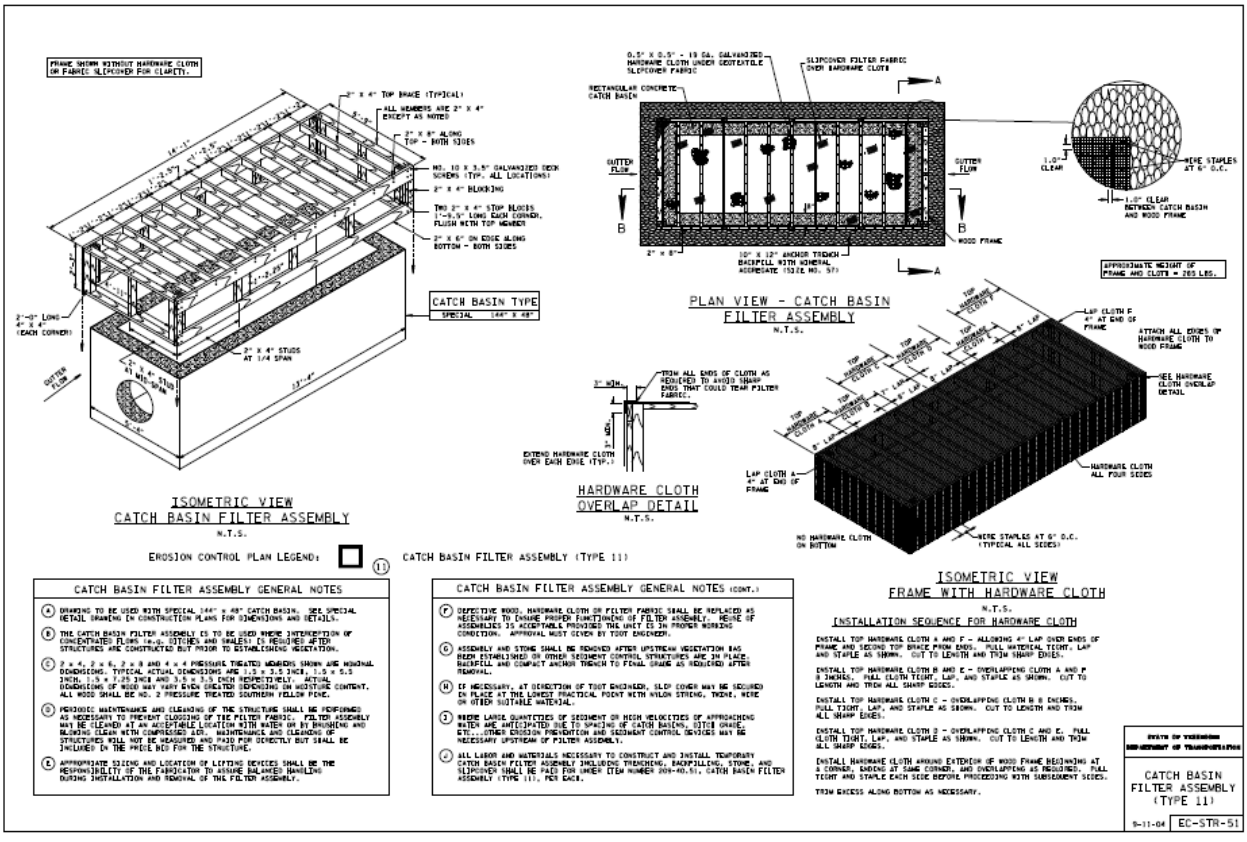

2" X 4" TOP BRACE
GEOTEXTILE FILTER FABRIC SLIPCOVER OVER HARDWARE CLOTH - WRAP GEOTEXTILE AROUND OUTSIDE OF WOOD FRAME AND ANCHOR AS SHOWN.
BELOW SLIPCOVER - PROVIDE GALVANIZED HARDWARE CLOTH FOR ADDED SUPPORT. ANCHOR TO FRAME USING HEAVY DUTY WIRE STAPLES.
2" X 4" STOP BLOCKS
2" X 4" AT MID-SPAN
1.0' CLEAR
TOP OF 2" X 6" FLUSH WITH TOP OF STRUCTURE
10" X 12" ANCHOR TRENCH BACKFILL TRENCH WITH NO. 57 STONE
2" X 6" BEYOND
48"
ANCHOR GEOTEXTILE FABRIC WITH MINIMUM 12" ANCHOR FLAP
FILTERED RUNOFF
SECTION A-A
N.T.S.
SLIPCOVER FILTER SPECIFICATIONS
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE
FABRIC PROPERTY | ASTM TEST METHOD | MINIMUM AVERAGE ROLL VALUES (MARV'S)
GRAB TENSILE STRENGTH | ASTM D4632 | 180 LBS
GRAB ELONGATION | ASTM D4632 | 50%
MULLEN BURST | ASTM D3786 | 350 PSI
PUNCTURE STRENGTH | ASTM D4833 | 105 LBS
TRAPEZOIDAL TEAR | ASTM D4533 | 75 LBS
APPARENT OPENING SIZE (AOS) | ASTM D4751 | FINER THAN OR EQUAL TO 40 % STANDARD SIEVE
PERMEABILITY | ASTM D4491 | .20 CM/SEC/SEC
PERMITTIVITY | ASTM D4491 | .2 SEC-1
WATER FLUX | ASTM D4491 | 120 GAL/MIN/FT2
UV RESISTANCE | ASTM D4355 | 70% AT 500 HOURS
WEIGHT | ASTM D3776 | MINIMUM 6 OZ/YD2
HARDWARE CLOTH SPECIFICATIONS
STANDARD SPECIFICATION | ASTM A740
OPENING SIZE | 0.5 INCH X 0.5 INCH
WIRE SIZE | 19 GAUGE
WIRE DIAMETER | 0.041 INCHES
WEIGHT | 0.2 LBS/SF
GRADE | LOW CARBON STEEL (C1008)
TYPE | WELDED HOT GALVANIZED STEEL WIRE FABRIC
2" X 4" TOP BRACE FLUSH WITH TOP OF 2" X 6"
(GEOTEXTILE FILTER FABRIC SLIPCOVER OVER HARDWARE CLOTH - WRAP GEOTEXTILE AROUND OUTSIDE OF WOOD FRAME AND ANCHOR AS SHOWN.
10" X 12" ANCHOR TRENCH BACKFILL WITH NO. 57 STONE
TWO 2" X 4" STOP BLOCKS
4" X 4" BEYOND
2" X 4" STUDS AT 1/3 SPAN
FLOW
5.5"
2" X 6" BEYOND
ANCHOR GEOTEXTILE FABRIC WITH MINIMUM 12" ANCHOR FLAP
56"
10" MIN. TRENCH WIDTH
SECTION B-B
N.T.S.
GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.
12" ANCHOR FLAPS (ALL FOUR SIDES)
2" BEYOND BOTTOM OF FRAME
SEWN EDGE
FABRICATION SPECIFICATIONS:
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO ENGINEERED ROWS OF LOCK-TYPE STITCHING, USING UV-RESISTED POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF 52X STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.
EROSION CONTROL PLAN LEGEND:
8
CATCH BASIN FILTER ASSEMBLY (TYPE B)
STATE OF VERMONT AGENCY OF TRANSPORTATION
CATCH BASIN FILTER ASSEMBLY (TYPE B) SLIPCOVER DETAILS
4-15-04
EC-STR-48A

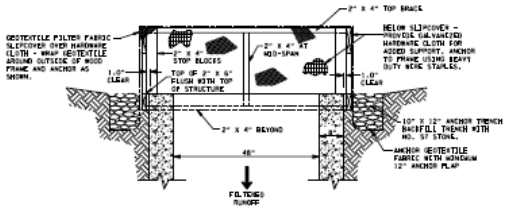

FRAME SHOWN WITHOUT HARDWARE CLOTH OR FABRIC SLIPCOVER FOR CLARITY.
2" x 4" BRIDGING AT MID-SPAN (STAGGERED)
ALL MEMBERS ARE 2" X 4" EXCEPT AS NOTED
NO. 10 X 3.5" GALVANIZED DECK SCREWS (TYP. ALL LOCATIONS)
2" X 4" BLOCKING
TWO 2" X 4" STOP BLOCKS 1'-9.5" LONG EACH CORNER, FLUSH WITH TOP MEMBER
2" X 6" TOP AND BOTTOM - BOTH SIDES
2'-0" LONG 4" X 4" (EACH CORNER)
2" X 4" STUDS AT 1/3 SPAN
CATCH BASIN TYPE
175
435C
ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY
N.T.S.
0.5" X 0.5" - 19 GA. GALVANIZED HARDWARE CLOTH (UNDER GEOTEXTILE SLIPCOVER FABRIC
SLIPCOVER FILTER FABRIC OVER HARDWARE CLOTH
STANDARD RECTANGULAR CONCRETE CATCH BASIN
GUTTER FLOW
WOOD FRAME
10" X 12" ANCHOR TRENCH BACKFILL WITH MINERAL AGGREGATE (SIZE NO. 57)
WIRE STAPLES AT 6" O.C.
1.0" CLEAR BETWEEN CATCH BASIN AND WOOD FRAME
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY
N.T.S.
TRIM ALL ENDS OF CLOTH AS REQUIRED TO AVOID SHARP ENDS THAT COULD TEAR FILTER FABRIC.
3" MIN.
EXTEND HARDWARE CLOTH OVER EACH EDGE (TYP.)
HARDWARE CLOTH OVERLAP DETAIL
N.T.S.
APPROXIMATE WEIGHT OF FRAME AND CLOTH = 240 LBS.
ATTACH ALL EDGES OF HARDWARE CLOTH TO WOOD FRAME
TOP HARDWARE CLOTH B
TOP HARDWARE CLOTH A
TOP HARDWARE CLOTH C
SEE HARDWARE CLOTH OVERLAP DETAIL
HARDWARE CLOTH ALL FOUR SIDES
NO HARDWARE CLOTH ON BOTTOM
WIRE STAPLES AT 6" O.C. (TYPICAL ALL SIDES)
ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH
N.T.S.
INSTALLATION SEQUENCE FOR HARDWARE CLOTH
INSTALL TOP HARDWARE CLOTH A. PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.
INSTALL TOP HARDWARE CLOTH B - OVERLAPPING CLOTH A 13.5 INCHES. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL TOP HARDWARE CLOTH C - OVERLAPPING CLOTH A. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL TOP HARDWARE CLOTH D - OVERLAPPING CLOTH B. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME USING ONE CONTINUOUS PIECE BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.
TRIM EXCESS ALONG BOTTOM AS NECESSARY.
EROSION CONTROL PLAN LEGEND:
9
CATCH BASIN FILTER ASSEMBLY (TYPE 9)
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES
A. DRAWING TO BE USED WITH STANDARD TYPES 175, AND 435C CATCH BASINS. SEE STANDARD DRAWINGS FOR CATCH BASIN DIMENSIONS AND DETAILS.
B. THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.
C. 2 x 4, 2 x 6 AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH, 1.5 x 5.5 INCH AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.
D. PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.
E. APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION AND REMOVAL OF THE FILTER ASSEMBLY.
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)
F. DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST GIVEN BY TDOT ENGINEER.
G. ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS REQUIRED AFTER REMOVAL.
H. IF NECESSARY, AT DIRECTION OF TDOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.
I. WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC...OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.
J. ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.49, CATCH BASIN FILTER ASSEMBLY (TYPE 9), PER EACH.
STATE OF VERMONT AGENCY OF TRANSPORTATION
CATCH BASIN FILTER ASSEMBLY (TYPE 9)
4-15-04
EC-STR-49


SLIPCOVER FILTER SPECIFICATIONS
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE
FABRIC PROPERTY | ASTM TEST METHOD | MINIMUM AVERAGE ROLL VALUES (MARV'S)
GRAB TENSILE STRENGTH | ASTM D4632 | ≥180 LBS
GRAB ELONGATION | ASTM D4632 | ≥50%
MULLEN BURST | ASTM D3786 | ≥330 PSI
PUNCTURE STRENGTH | ASTM D4833 | ≥105 LBS
TRAPEZOIDAL TEAR | ASTM D4533 | ≥75 LBS
APPARENT OPENING SIZE (AOS) | ASTM D4751 | #70 (NO MORE THAN OR EQUAL TO #60 U.S. STANDARD SIEVE)
PERMEABILITY | ASTM D4491 | ≥0.12 INCHES/SEC
PERMITTIVITY | ASTM D4491 | ≥1.5 SEC-1
WATER FLUX | ASTM D4491 | ≥110 GAL/MIN/FT2
UV RESISTANCE | ASTM D4355 | ≥70% AT 500 HOURS
WEIGHT | ASTM D3776 | MINIMUM 6 OZ/YD2
HARDWARE CLOTH SPECIFICATIONS
STANDARD SPECIFICATION | ASTM A740
OPENING SIZE | 0.5 INCH X 0.5 INCH
WIRE SIZE | 19 GAUGE
WIRE DIAMETER | 0.041 INCHES
WEIGHT | ≈ 0.2 LBS/SF
GRADE | LOW CARBON STEEL (C1008)
TYPE | WELDED HOT GALVANIZED STEEL WIRE FABRIC
GEOTEXTILE FILTER FABRIC SLIPCOVER OVER HARDWARE CLOTH - WRAP GEOTEXTILE AROUND OUTSIDE OF WOOD FRAME AND ANCHOR AS SHOWN.
2" X 4" TOP BRACE
2" X 4" AT MID-SPAN
BELOW SLIPCOVER - PROVIDE GALVANIZED HARDWARE CLOTH FOR ADDED SUPPORT. ANCHOR TO FRAME USING HEAVY DUTY WIRE STAPLES.
2" X 4" STOP BLOCKS
TOP OF 2" X 6" FLUSH WITH TOP OF STRUCTURE
1.0' CLEAR
10" X 12" ANCHOR TRENCH BACKFILL TRENCH WITH NO. 57 STONE.
2" X 4" BEYOND
62"
ANCHOR GEOTEXTILE FABRIC WITH MINIMUM 12" ANCHOR FLAP
SECTION A-A
N.T.S.
2" X 4" BRIDGING
2" X 4" STUDS AT 1/3 SPAN
TWO 2" X 4" STOP BLOCKS
4" X 4" BEYOND
2" X 6" BEYOND
96"
FILTERED RUNOFF
SECTION B-B
N.T.S.
EROSION CONTROL PLAN LEGEND:
9
CATCH BASIN FILTER ASSEMBLY (TYPE 9)
GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.
12" ANCHOR FLAPS (ALL FOUR SIDES)
2" BEYOND BOTTOM OF FRAME
SEWN EDGE
FABRICATION SPECIFICATIONS:
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEWN WITH TWO ENDEMENT ROWS OF LOCK-TYPE STITCHING, USING UN-BONDED POLYESTER THREAD (MINIMUM OF 130 POUNDS) WITH MINIMUM OF SIX STITCHES PER INCH.
3. THE ENDING ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC ENDS.
STATE OF WASHINGTON DEPARTMENT OF TRANSPORTATION
CATCH BASIN FILTER ASSEMBLY (TYPE 9) SLIPCOVER DETAILS
4-15-04
EC-STR-49A


FRAME SHOWN WITHOUT HARDWARE CLOTH OR FABRIC SLIPCOVER FOR CLARITY.
2" X 6" BRIDGING AT 1/3 SPAN (STAGGERED)
2" X 8" TOP BRACE (TYPICAL) W/ GALVANIZED JOIST HANGERS AT EACH END
ALL MEMBERS ARE 2" X 4" EXCEPT AS NOTED
2" X 8" ALONG TOP - BOTH SIDES
NO. 10 X 3.5" GALVANIZED DECK SCREWS (TYP. ALL LOCATIONS)
2" X 4" BLOCKING
3.5" X 3/8" DIA. GALVANIZED LAG SCREWS 2 - TOP AND BOTTOM (TYP.) BOTH SIDES
2" X 6" ON EDGE ALONG BOTTOM - BOTH SIDES
2'-0" LONG 4" X 4" (EACH CORNER)
2" X 4" STUDS AT 1/4 SPAN
2" X 4" STUDS AT 1/3 SPAN
CATCH BASIN TYPE
SPECIAL 132" X 132"
ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY
N.T.S.
PLAN VIEW - CATCH BASIN FILTER ASSEMBLY
N.T.S.
SLIPCOVER FILTER FABRIC OVER HARDWARE CLOTH
SQUARE CONCRETE CATCH BASIN
0.5" X 0.5" - 19 GA. GALVANIZED HARDWARE CLOTH UNDER GEOTEXTILE SLIPCOVER FABRIC
10" X 12" ANCHOR TRENCH BACKFILL WITH MINERAL AGGREGATE (SIZE NO. 57)
WOOD FRAME
3.5" X 3/8" DIA. GALVANIZED LAG SCREWS
WIRE STAPLES AT 6" O.C.
2.5" CLEAR
2.5" CLEAR BETWEEN CATCH BASIN AND WOOD FRAME
TRIM ALL ENDS OF CLOTH AS REQUIRED TO AVOID SHARP ENDS THAT COULD TEAR FILTER FABRIC.
EXTEND HARDWARE CLOTH OVER BASIN EDGE (TYP.)
HARDWARE CLOTH OVERLAP DETAIL
N.T.S.
EROSION CONTROL PLAN LEGEND:
10
CATCH BASIN FILTER ASSEMBLY (TYPE 10)
LAP CLOTH F 4" AT END OF FRAME
LAP CLOTH A 4" AT END OF FRAME
APPROXIMATE WEIGHT OF FRAME AND CLOTH = 1150 LBS. ±
ATTACH ALL EDGES OF HARDWARE CLOTH TO WOOD FRAME
SEE HARDWARE CLOTH OVERLAP DETAIL
NO HARDWARE CLOTH ON BOTTOM
HARDWARE CLOTH ALL FOUR SIDES.
WIRE STAPLES AT 6" O.C. (TYPICAL ALL SIDES)
ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH
N.T.S.
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES
A. DRAWING TO BE USED WITH SPECIAL 132" X 132" BASIN. SEE DETAIL DRAWING IN CONSTRUCTION PLANS FOR DIMENSIONS AND DETAILS.
B. THE CATCH BASIN FILTER ASSEMBLY IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. DITCHES AND SWALES) IS REQUIRED AFTER STRUCTURES ARE CONSTRUCTED BUT PRIOR TO ESTABLISHING VEGETATION.
C. 2 x 4, 2 x 6, 2 x 8, AND 4 x 4 PRESSURE TREATED MEMBERS SHOWN ARE NOMINAL DIMENSIONS. TYPICAL ACTUAL DIMENSIONS ARE 1.5 x 3.5 INCH, 1.5 x 5.5 INCH, 1.5 x 7.25 INCH, AND 3.5 x 3.5 INCH RESPECTIVELY. ACTUAL DIMENSIONS OF WOOD MAY VARY EVEN GREATER DEPENDING ON MOISTURE CONTENT. ALL WOOD SHALL BE NO. 2 PRESSURE TREATED SOUTHERN YELLOW PINE.
D. PERIODIC MAINTENANCE AND CLEANING OF THE STRUCTURE SHALL BE PERFORMED AS NECESSARY TO PREVENT CLOGGING OF THE FILTER FABRIC. FILTER ASSEMBLY MAY BE CLEANED AT AN ACCEPTABLE LOCATION WITH WATER OR BY BRUSHING AND BLOWING CLEAN WITH COMPRESSED AIR. MAINTENANCE AND CLEANING OF STRUCTURES WILL NOT BE MEASURED AND PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE PRICE BID FOR THE STRUCTURE.
E. APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR TO ASSURE BALANCED HANDLING DURING INSTALLATION AND REMOVAL OF THE FILTER ASSEMBLY.
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)
F. DEFECTIVE WOOD, HARDWARE CLOTH OR FILTER FABRIC SHALL BE REPLACED AS NECESSARY TO ENSURE PROPER FUNCTIONING OF FILTER ASSEMBLY. REUSE OF ASSEMBLIES IS ACCEPTABLE PROVIDED THE UNIT IS IN PROPER WORKING CONDITION. APPROVAL MUST BE GIVEN BY TDOT ENGINEER.
G. ASSEMBLY AND STONE SHALL BE REMOVED AFTER UPSTREAM VEGETATION HAS BEEN ESTABLISHED OR OTHER SEDIMENT CONTROL STRUCTURES ARE IN PLACE. BACKFILL AND COMPACT ANCHOR TRENCH TO FINAL GRADE AS MEASURED AFTER REMOVAL.
H. IF NECESSARY, AT DIRECTION OF TDOT ENGINEER, SLIPCOVER MAY BE SECURED IN PLACE AT THE LOWEST PRACTICAL POINT WITH NYLON STRING, TWINE, WIRE OR OTHER SUITABLE MATERIAL.
I. WHERE LARGE QUANTITIES OF SEDIMENT OR HIGH VELOCITIES OF APPROACHING WATER ARE ANTICIPATED DUE TO SPACING OF CATCH BASINS, DITCH GRADE, ETC., OTHER EROSION PREVENTION AND SEDIMENT CONTROL DEVICES MAY BE NECESSARY UPSTREAM OF FILTER ASSEMBLY.
J. ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT AND INSTALL TEMPORARY CATCH BASIN FILTER ASSEMBLY INCLUDING TRENCHING, BACKFILLING, STONE, AND SLIPCOVER SHALL BE PAID FOR UNDER ITEM NUMBER 209-40.50, CATCH BASIN FILTER ASSEMBLY (TYPE 10), PER EACH.
K. CATCH BASIN FILTER ASSEMBLY NOT DESIGNED FOR VEHICULAR OR PEDESTRIAN TRAFFIC.
INSTALLATION SEQUENCE FOR HARDWARE CLOTH
INSTALL TOP HARDWARE CLOTH A AND F - ALLOWING 4" LAP OVER ENDS OF FRAME AND SECOND TOP BRACE FROM ENDS. PULL MATERIAL TIGHT, LAP AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM SHARP EDGES.
INSTALL TOP HARDWARE CLOTH B AND E - OVERLAPPING CLOTH A AND F 6 INCHES. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL TOP HARDWARE CLOTH C - OVERLAPPING CLOTH B 6 INCHES. PULL TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL TOP HARDWARE CLOTH D - OVERLAPPING CLOTH C AND E. PULL CLOTH TIGHT, LAP, AND STAPLE AS SHOWN. CUT TO LENGTH AND TRIM ALL SHARP EDGES.
INSTALL HARDWARE CLOTH AROUND EXTERIOR OF WOOD FRAME BEGINNING AT A CORNER, ENDING AT SAME CORNER, AND OVERLAPPING AS REQUIRED. PULL TIGHT AND STAPLE EACH SIDE BEFORE PROCEEDING WITH SUBSEQUENT SIDES.
TRIM EXCESS ALONG BOTTOM AS NECESSARY.
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION
CATCH BASIN FILTER ASSEMBLY (TYPE 10)
EC-STR-50


SECTION A-A
N.T.S.
SECTION B-B
N.T.S.
EROSION CONTROL PLAN LEGEND:
CATCH BASIN FILTER ASSEMBLY (TYPE 10)
SLIPCOVER FILTER SPECIFICATIONS
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE
HARDWARE CLOTH SPECIFICATIONS
GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.
FABRICATION SPECIFICATIONS:
CATCH BASIN FILTER ASSEMBLY (TYPE 10) SLIPCOVER DETAILS
EC-STR-50A

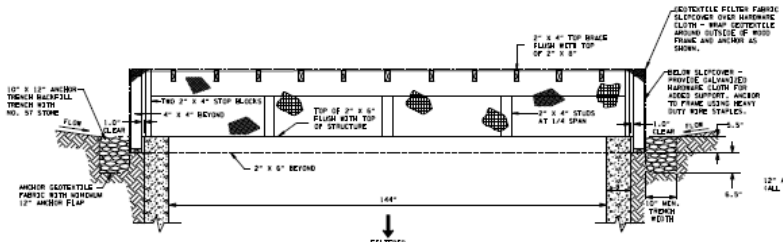

ISOMETRIC VIEW
CATCH BASIN FILTER ASSEMBLY
N.T.S.
PLAN VIEW - CATCH BASIN
FILTER ASSEMBLY
N.T.S.
HARDWARE CLOTH
OVERLAP DETAIL
N.T.S.
ISOMETRIC VIEW
FRAME WITH HARDWARE CLOTH
N.T.S.
EROSION CONTROL PLAN LEGEND:
CATCH BASIN FILTER ASSEMBLY (TYPE 11)
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES
CATCH BASIN FILTER ASSEMBLY GENERAL NOTES (CONT.)
INSTALLATION SEQUENCE FOR HARDWARE CLOTH
CATCH BASIN FILTER ASSEMBLY (TYPE 11)
9-11-04
EC-STR-51



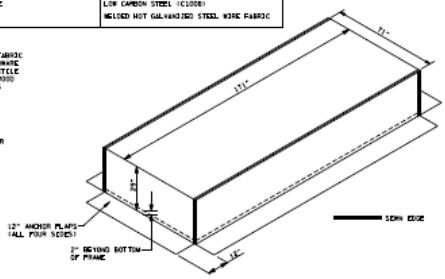
SECTION A-A
N.T.S.

SLIPCOVER FILTER SPECIFICATIONS		
FABRIC TYPE : NON-WOVEN, NEEDLE-PUNCHED GEOTEXTILE		
FABRIC PROPERTY	ASTM TEST METHOD	MINIMUM AVERAGE ROLL VALUES (MARV'S)
GRAB TENSILE STRENGTH	ASTM D4632	≥180 LBS
GRAB ELONGATION	ASTM D4632	≥50%
MULLEN BURST	ASTM D3786	≥350 PSI
PUNCTURE STRENGTH	ASTM D4833	≥105 LBS
TRAPEZOIDAL TEAR	ASTM D4533	≥75 LBS
APPARENT OPENING SIZE (AOS)	ASTM D4751	FINER THAN OR EQUAL TO #80 U.S. STANDARD SIEVE
PERMEABILITY	ASTM D4491	≥0.10 CM/SEC
PERMITTIVITY	ASTM D4491	≥2.0 SEC^{-1}
WATER FLUX	ASTM D4491	≥120 GAL/MIN/FT^2
UV RESISTANCE	ASTM D4355	≥70% AT 500 HOURS
WEIGHT	ASTM D5776	MINIMUM 6 OZ/YD^2

HARDWARE CLOTH SPECIFICATIONS	
STANDARD SPECIFICATION	ASTM A740
OPENING SIZE	0.5 INCH X 0.5 INCH
WIRE SIZE	19 GAUGE
WIRE DIAMETER	0.041 INCHES
WEIGHT	≈ 0.2 LBS/SF
GRADE	LOW CARBON STEEL (C1008)
TYPE	WELDED HOT GALVANIZED STEEL WIRE FABRIC



SECTION B-B
N.T.S.



GEOTEXTILE SLIPCOVER FABRICATION
N.T.S.

FABRICATION SPECIFICATIONS:

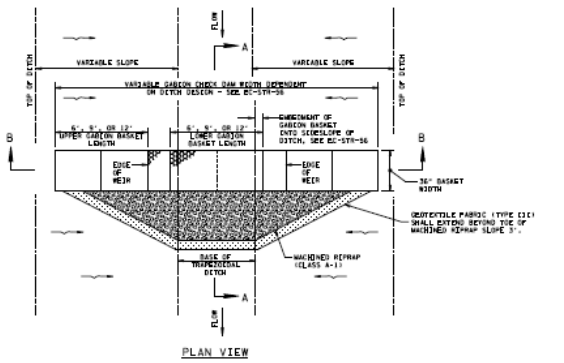
1. GEOTEXTILE SLIPCOVER FABRIC SHALL HAVE HEAT-CUT FUSING FABRIC EDGES FOR STRENGTH.
2. ALL SEAMS SHALL BE SEAM WITH TWO (MINIMUM) ROWS OF LOCK-TYPE STITCHING, USING UV-BONDED POLYESTER THREAD (MINIMUM OF 138 POUNDS) WITH MINIMUM OF 5X STITCHES PER INCH.
3. THE INSIDE ROW OF STITCHING SHALL BE A MINIMUM OF 0.5" FROM HEAT-CUT FABRIC EDGES.

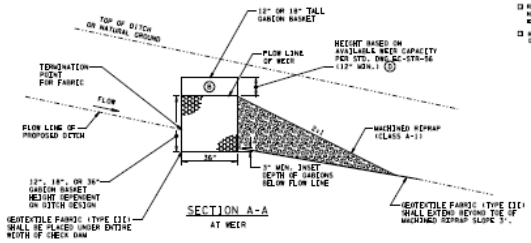
EROSION CONTROL PLAN LEGEND: (11) CATCH BASIN FILTER ASSEMBLY (TYPE 11)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

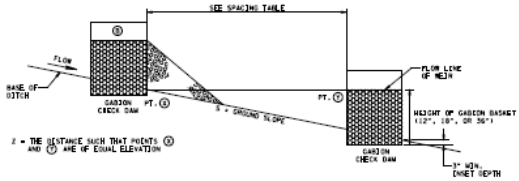
CATCH BASIN FILTER ASSEMBLY (TYPE 11) SLIPCOVER DETAILS

9-11-04 EC-STR-51A



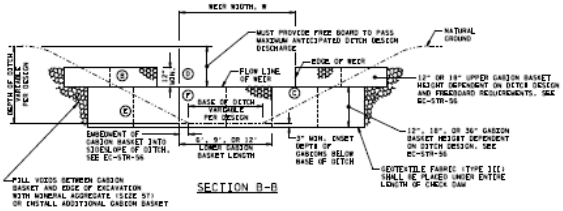


SECTION A-A
AT WEIR



Z = THE DISTANCE SUCH THAT POINTS ⑥ AND ⑦ ARE OF EQUAL ELEVATION

GABION CHECK DAM SPACING AT CENTER OF WEIR



SECTION B-B

GABION CHECK DAM GENERAL NOTES
(A) GABION CHECK DAMS ARE USED FOR VELOCITY REDUCTION AND EROSION PREVENTION IN AREAS WHERE CONCENTRATED FLOWS EXIST. GABION CHECK DAMS ARE NOT TO BE USED FOR SEDIMENT CONTROL AND SHOULD NOT BE CONSIDERED A SEDIMENT TRAPPING DEVICE. GABION CHECK DAMS SHALL NOT BE USED IN STREAMS OR OTHER NATURAL WATER RESOURCES.
(B) HEIGHT OF UPPER GABION SHALL BE OF EQUAL OR LESSER HEIGHT THAN LOWER GABION AND SHALL NOT EXCEED 18".
(C) VERTICAL JOINTS OF GABION BASKETS SHALL BE STAGGERED.
(D) SIZE WEIR TO CONTAIN THE 2-YEAR, 24-HOUR STORM. CONTAIN DESIGN DISCHARGE WITHIN WEIR STRUCTURE WHERE POSSIBLE. FOR SITES WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, THE WEIR SHALL BE SIZED TO CONTAIN THE 5-YEAR, 24-HOUR STORM.
(E) DIAPHRAGMS SEPARATE ENDEVOUAL GABION CELLS.
(F) BASKET-TO-BASKET CONNECTIONS SHALL BE AS DIRECTED
(G) THE DRAINAGE AREA FOR THE GABION CHECK DAM SHALL BE 35 ACRES OR LESS.
(R) SEE STANDARD DRAWINGS EC-STR-56, EC-STR-57, EC-STR-58, AND EC-STR-59 FOR ADDITIONAL DETAILS AND GENERAL NOTES NOT SHOWN ON THIS DRAWING.

MAXIMUM GABION CHECK DAM SPACING TABLE (IN FEET)			
GROUND SLOPE, S (FT/FT)	12-INCH BASKETS	18-INCH BASKETS	36-INCH BASKETS
0.010	72	122	272
0.015	47	81	181
0.020	35	60	135
0.030	22	39	89
0.040	16	29	66
0.050	12	22	52
0.060	10	18	43
0.070	N/A	15	37
0.080	N/A	13	32
0.090	N/A	11	28
0.100	N/A	10	25
0.110	N/A	N/A	22
0.120	N/A	N/A	20
0.130	N/A	N/A	19
0.140	N/A	N/A	17
0.150	N/A	N/A	16
0.200	N/A	N/A	11

EROSION CONTROL PLAN LEGEND: GABION CHECK DAM

□ MINOR REVISION -- FINAL APPROVAL NOT REQUIRED.

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

GABION CHECK DAM

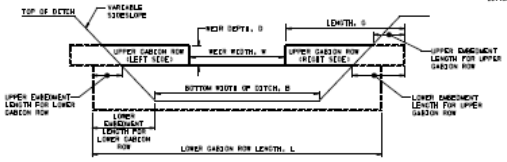
7-29-04 EC-STR-55

REV. 4-13-05: REFORMATTED SHEET, REVISED TABLES. MISC. EDITS TO ENGLISH.

REV. 4-1-08: MINOR REVISIONS TO TABLES, ADDED GABION TO BOTTOM TABLE.

DESIGN DIMENSIONS, UPPER GABION ROW

BOTTOM WIDTH OF DITCH, B IN FEET	UPPER GABION ROW, 12-INCH GABION HEIGHT						UPPER GABION ROW, 18-INCH GABION HEIGHT						BOTTOM WIDTH OF DITCH, B IN FEET
	MINIMUM LENGTH OF GABIONS, G (ONE PER SIDE) (UPPER ROW), IN FEET			LOWER EASEMENT LENGTH FOR UPPER GABIONS, IN FEET			MINIMUM LENGTH OF GABIONS, G (ONE PER SIDE) (UPPER ROW), IN FEET			LOWER EASEMENT LENGTH FOR UPPER GABIONS, IN FEET			
	SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			
	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	
3	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	3
4	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	4
5	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	5
6	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	6
7	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	7
8	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	8
9	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	9
10	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	10
12	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	12
15	3	6	6	2.1	4.5	4.5	6	9	9	3.3	5.4	6.3	15



DEFINITION OF TERMS FOR GABION CHECK DAM IN TRAPEZOIDAL DITCH

DESIGN DIMENSIONS, LOWER GABION ROW

BOTTOM WIDTH OF DITCH, B IN FEET	LOWER GABION ROW, 12-INCH GABION HEIGHT									LOWER GABION ROW, 18-INCH GABION HEIGHT									LOWER GABION ROW, 36-INCH GABION HEIGHT									BOTTOM WIDTH OF DITCH, B IN FEET
	MINIMUM LENGTH OF GABIONS, L (LOWER ROW), IN FEET			LOWER EASEMENT LENGTH, IN FEET			UPPER EASEMENT LENGTH, IN FEET			MINIMUM LENGTH OF GABIONS, L (LOWER ROW), IN FEET			LOWER EASEMENT LENGTH, IN FEET			UPPER EASEMENT LENGTH, IN FEET			MINIMUM LENGTH OF GABIONS, L (LOWER ROW), IN FEET			LOWER EASEMENT LENGTH, IN FEET			UPPER EASEMENT LENGTH, IN FEET			
	SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			
	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	
3	9	9	12	3	3	4.5	1.5	0.75	1.5	9	12	15	3	4.5	6	0.5	0.75	1	15	21	27	6	9	12	0.5	0.75	1	3
4	9	9	12	2.5	3.5	4	1	0.25	1	12	15	15	4	5.5	5.5	1.5	1.75	0.5	18	21	27	7	8.5	11.5	1.5	0.25	0.5	4
5	9	12	12	3	3.5	3.5	0.5	1.25	0.5	12	15	18	3.5	5	5.5	1	1.25	1.5	18	24	30	6.5	9.5	12.5	1	1.25	1.5	5
6	12	12	15	3	3	4.5	1.5	0.75	1.5	12	15	18	3	4.5	6	0.5	0.75	1	18	24	30	6	9	12	0.5	0.75	1	6
7	12	15	15	2.5	4	4	1	1.75	1	15	15	18	4	4	5.5	1.5	0.25	0.5	21	24	30	7	8.5	11.5	1.5	0.25	0.5	7
8	12	15	15	2	3.5	3.5	0.5	1.25	0.5	15	18	21	3.5	5	5.5	1	1.25	1.5	21	27	33	6.5	9.5	12.5	1	1.25	1.5	8
9	15	15	18	3	3	4.5	1.5	0.75	1.5	15	18	21	3	4.5	6	0.5	0.75	1	21	27	33	6	9	12	0.5	0.75	1	9
10	15	15	18	2.5	2.5	4	1	0.25	1	18	18	21	4	4	5.5	1.5	0.25	0.5	24	27	33	7	8.5	11.5	1.5	0.25	0.5	10
12	18	18	21	3	3	4.5	1.5	0.75	1.5	18	21	24	3	4.5	6	0.5	0.75	1	24	30	36	6	9	12	0.5	0.75	1	12
15	21	21	24	3	3	4.5	1.5	0.75	1.5	21	24	27	3	4.5	6	0.5	0.75	1	27	33	39	6	9	12	0.5	0.75	1	15

+ ASSUMING 3 INCH EMBEDMENT DEPTH AT BASE OF GABION

GABION CHECK DAM WEIR LENGTHS AND ALLOWABLE FLOW RATES

BOTTOM WIDTH OF DITCH, B IN FEET	UPPER GABION ROW, 12-INCH GABION HEIGHT												UPPER GABION ROW, 18-INCH GABION HEIGHT												BOTTOM WIDTH OF DITCH, B IN FEET
	12-INCH LOWER GABION ROW						18-INCH LOWER GABION ROW						36-INCH LOWER GABION ROW						12-INCH LOWER GABION ROW						18-INCH LOWER GABION ROW					
	RECTANGULAR WEIR WIDTH, W IN FEET			ALLOWABLE FLOW (cfs) FOR 12-INCH UPPER GABION HEIGHT			RECTANGULAR WEIR WIDTH, W IN FEET			ALLOWABLE FLOW (cfs) FOR 12-INCH UPPER GABION HEIGHT			RECTANGULAR WEIR WIDTH, W IN FEET			ALLOWABLE FLOW (cfs) FOR 18-INCH UPPER GABION HEIGHT			RECTANGULAR WEIR WIDTH, W IN FEET			ALLOWABLE FLOW (cfs) FOR 18-INCH UPPER GABION HEIGHT			RECTANGULAR WEIR WIDTH, W IN FEET			ALLOWABLE FLOW (cfs) FOR 18-INCH UPPER GABION HEIGHT			
	SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			SIDESLOPE			
	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	2:1	3:1	4:1	
3	4.2	4.5	6	4.7	6.3	6.9	6.2	7.5	10	7.6	9.6	11.4	12.2	16.5	22	20.4	27.0	34.3	2.6	3.3	7.6	13.4	16.8	15.4	8.6	12.3	19.6	23.1	31.6	35.6	3
4	5.2	5.5	7	5.6	7.1	7.7	7.2	8.5	11	9.0	11.3	12.8	13.2	17.5	23	23.2	30.6	37.1	3.6	4.3	8.6	13.2	17.7	14.7	9.6	13.3	20.6	25.9	33.8	36.5	4
5	6.2	6.5	8	6.5	7.9	8.6	8.2	9.5	12	10.4	13.7	14.3	14.2	18.5	24	26.1	33.6	40.0	4.6	5.3	9.6	13.9	17.9	16.0	10.6	14.3	21.6	28.8	36.7	41.4	5
6	7.2	7.5	9	7.5	8.8	9.5	9.2	10.5	13	11.9	14.2	15.7	15.2	19.5	25	29.0	36.5	42.9	5.6	6.3	10.6	15.6	18.7	17.4	11.5	15.2	22.6	31.7	39.6	44.4	6
7	8.2	8.5	10	8.4	9.8	10.4	10.2	11.5	14	13.4	15.7	17.2	16.2	20.5	26	31.9	38.5	45.9	6.6	7.3	11.6	16.1	19.7	18.7	12.5	16.3	23.6	34.7	42.6	47.2	7
8	9.2	9.5	11	9.4	10.7	11.4	11.2	12.5	15	14.9	17.1	18.6	17.2	21.5	27	34.5	40.3	46.8	7.6	8.3	12.6	17.3	20.9	20.1	13.5	17.3	24.6	37.7	45.7	50.0	8
9	10.2	10.5	12	10.4	11.7	12.3	12.2	13.5	16	16.4	18.6	20.1	18.2	22.5	28	37.0	43.1	51.0	8.6	9.3	13.6	18.6	22.0	21.5	14.4	18.3	25.6	40.7	48.4	53.2	9
10	11.2	11.5	13	11.4	12.6	13.3	13.2	14.5	17	18.0	20.1	21.6	19.2	23.5	29	41.0	48.3	54.8	9.6	10.3	14.6	20.2	23.4	23.0	15.6	19.3	26.6	43.8	51.6	56.2	10
12	13.2	13.5	15	13.4	14.6	15.2	15.2	16.5	19	21.0	23.2	24.6	21.2	25.5	31	47.1	54.4	60.9	11.6	12.3	16.6	23.2	26.1	26.0	17.6	21.3	28.6	49.8	57.7	62.3	12
15	16.2	16.5	18	16.5	17.6	18.2	18.2	19.5	22	25.8	27.8	29.2	24.2	28.5	34	56.4	65.6	70.1	14.6	15.3	19.6	27.8	30.5	30.5	20.6	24.3	31.6	59.2	66.9	71.4	15

EROSION CONTROL PLAN LEGEND: GABION CHECK DAM

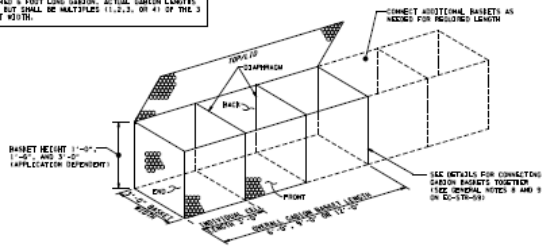
STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

GABION CHECK DAM DESIGN TABLES

7-29-04 EC-STR-56

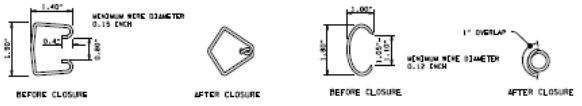
REV. 4-1-08: REVISED TEXT ON TYPE 3 DETAIL.

EXAMPLE BELOW SHOWS 3-CELLED, 9 FOOT LONG GABION BASKET WITH ATTACHED 6 FOOT LONG GABION. ACTUAL GABION LENGTHS WILL VARY, BUT SHALL BE MULTIPLES 11,2,3, OR 4) OF THE 3 FOOT BASKET WIDTH.



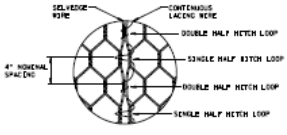
ISOMETRIC - TYPICAL GABION

N.T.S.



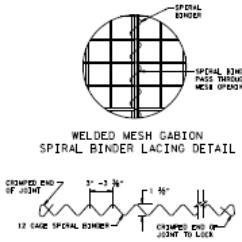
TYPE 1 FASTENER INTERLOCKING WIRE

TYPE 2 FASTENER OVERLAPPING RING



WOVEN WIRE GABION LACING DETAIL

TYPE 3 FASTENER LACING WIRE



WELDED MESH GABION SPIRAL BINDER LACING DETAIL

TYPE 4 FASTENER SPIRAL BINDER

TO BE USED WITH WELDED MESH ONLY

NOTE: DIMENSIONS SHOWN ARE NOMINAL

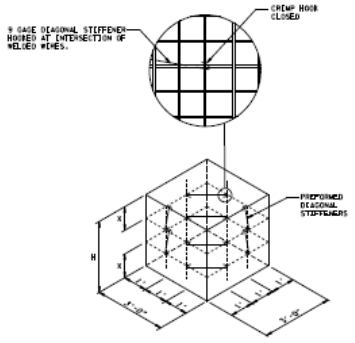
INSTALL TYPE 1 OR TYPE 2 FASTENERS AT EACH MESH OPENING ALONG GABION BASKET EDGE.

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

GABION ASSEMBLY DETAILS

7-29-04 EC-STR-57

REV. 4-1-08: MINOR TEXT REVISION.

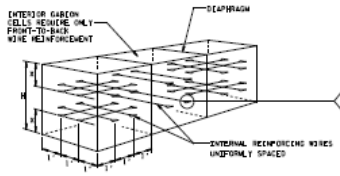


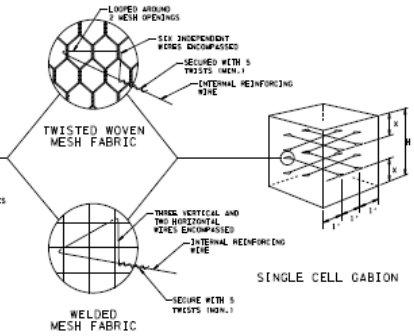
ALL GABION CELLS

CELL HEIGHT H (FT)	DIAGONAL STIFFENER SPACING, X
3'-0"	1/3H & 2/3H
1'-6"	1/2H
1'-0"	NONE

OPTIONAL DIAGONAL CORNER STIFFENERS FOR WELDED WIRE GABION BASKETS ONLY

N.T.S.





CELL HEIGHT H (FT)	TIE WIRE SPACING, X
3'-0"	1/3H & 2/3H
1'-6"	1/2H
1'-0"	NONE

PLACEMENT OF INTERNAL CONNECTING WIRE REINFORCEMENT

N.T.S.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

GABION ASSEMBLY DETAILS

7-29-04 | EC-STR-58

REV. 4-15-04: INFORMATIVE SHEET. REVISED NOTES. MINR. EDITS TO DRAWING.

REV. 4-1-08: REVISED GENERAL NOTES. REMOVED SECTICULE SPEC. TABLE. REFORMATTED SHEET.

REV. 8-1-12: MINOR EDITS TO GENERAL NOTES. ADDED NOTE BELOW COMPONENT PROPERTIES.

GABION CHECK DAM GENERAL NOTES

(A) GABIONS SHALL BE APPLIED AS CHECK DAMS WHERE ALLOWABLE MAXIMUM SHEAR FORCES AND VELOCITIES FOR LOOSE RIP RAP ARE EXCEEDED.

(B) GABION CHECK DAMS SHALL NOT BE USED IN STREAMS.

(C) GABION CHECK DAMS ARE TO BE USED, PRIMARILY AS AN EROSION CONTROL MEASURE FOR VELOCITY REDUCTION. AN APPROPRIATE GABION CHECK DAM CONFIGURATION MAY BE SELECTED USING EC-STR-58. THE 2-YEAR PEAK FLOW RATE MUST BE LESS THAN OR EQUAL TO THE MESH FLOW SHOWN FOR THE SELECTED GABION CHECK DAM CONFIGURATION. AT SITES WHERE (MAJOR TO EXCEPTIONAL TENNESSEE WATERS OR NEARBY-IMPAIRED) STREAMS, THE 5-YEAR PEAK FLOW RATE MUST BE LESS THAN OR EQUAL TO THE MESH FLOW SHOWN ON THE TABLE.

(D) GABION CHECK DAMS MAY REMAIN IN PLACE AS PERMANENT CHECK DAMS, IF SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

(E) THE CENTER OF THE GABION CHECK DAM MUST BE AT LEAST ONE (1) FOOT LOWER THAN THE OUTER EDGES. THIS WILL ELIMINATE THE BASKET-SOIL FAILURE POINT WHERE THE GABION CHECK DAM AND NATURAL GROUND MEYOR.

(F) WIRE MESH GABION ALTERNATES:

1. WOVEN MESH - NON-RAVELING TRIPLE TWISTED HEXAGONAL WIRE MESH, CONSISTING OF TWO WIRES TWISTED TOGETHER IN THREE 180 DEGREE TURNS. AREA OF MESH OPENINGS SHALL NOT EXCEED 10 SQUARE INCHES. THE MINIMUM LINEAR DIMENSION OF A WOVEN MESH OPENING SHALL NOT EXCEED 4.5 INCHES.

2. WELDED MESH - WELDED WIRE MESH WITH A UNIFORM SQUARE OR RECTANGULAR PATTERN AND RESISTANCE WELD AT EACH INTERSECTION. THE WELDED WIRE CONNECTIONS SHALL CONFORM WITH THE REQUIREMENTS OF ASTM A185, INCLUDING WIRE SMALLER THAN W1.2 (0.124 IN.), EXCEPT THAT THE WELDED CONNECTIONS SHALL HAVE A MINIMUM AVERAGE SHEAR STRENGTH OF 70% AND A MINIMUM SHEAR STRENGTH OF 60% OF THE MINIMUM ULTIMATE TENSILE STRENGTH OF THE WIRE. WIRE SHALL BE GALVANIZED AFTER THE FORMING OF THE WELDED MESH.

(G) WIRE FOR FABRICATION AND ASSEMBLY SHALL BE HOT-DIPPED GALVANIZED. TIE WIRE SHALL HAVE A MINIMUM TENSILE STRENGTH OF 60,000 PSI. GALVANIZED STEEL WIRE SHALL CONFORM TO ASTM A641, CLASS 3, SOFT TEMPER.

(H) TYPE 1, TYPE 2 AND TYPE 3 FASTENERS MUST PROVIDE A MINIMUM STRENGTH OF 1,400 POUNDS PER LINEAR FOOT FOR GABION BASKETS. ALL FASTENERS SHALL MEET ALL OF THE COATING REQUIREMENTS OF THE GABION MANUFACTURER IN ADDITION TO ANY REQUIREMENTS SPECIFIED ON THESE GENERAL NOTES.

(I) TYPE 4 SPIRAL BINDERS ARE FOR WELDED-MESH GABION BASKETS ONLY AND SHALL BE FORMED FROM WIRE MEETING THE SAME QUALITY AND COATING THICKNESS REQUIREMENTS AS SPECIFIED FOR THE GABION BASKETS. ALTERNATE FASTENERS FOR USE WITH WIRE MESH GABIONS, SUCH AS RING FASTENERS, SHALL BE FORMED FROM WIRE MEETING THE SAME QUALITY AND COATING THICKNESS REQUIREMENTS AS SPECIFIED FOR THE GABIONS.

(J) FOUNDATION PREPARATION - SURFACE IRREGULARITIES, LOOSE MATERIAL, VEGETATION, AND ALL FOREIGN MATTER SHALL BE REMOVED FROM FOUNDATIONS.

(K) ASSEMBLY - ROTATE THE GABION PANELS INTO POSITION AND JOIN THE VERTICAL EDGES WITH FASTENERS FOR GABION ASSEMBLY. WHERE LACING WIRE IS USED, WRAP THE WIRE WITH ALTERNATING SINGLE AND DOUBLE HALF-HITCHES AT INTERVALS BETWEEN FOUR (4) TO FIVE (5) INCHES. WHERE SPIRAL FASTENERS ARE USED FOR WELDED-WIRE MESH, CROMP THE ENDS TO SECURE THE SPIRALS IN PLACE. WHERE RING TYPE ALTERNATE FASTENERS ARE USED FOR BASKET ASSEMBLY, INSTALL THE FASTENERS AT A MAXIMUM SPACING OF 6 INCHES. USE THE SAME FASTENING PROCEDURES TO INSTALL INTERIOR DIAPHRAGMS WHERE THEY ARE REQUIRED. INTERIOR DIAPHRAGMS WILL BE REQUIRED WHEN ANY INSIDE DIMENSION OF A GABION BASKET EXCEEDS 3 FEET.

(L) PLACEMENT - PLACE THE EMPTY GABIONS ON THE FOUNDATION AND INTERCONNECT THE ADJACENT GABIONS ALONG THE TOP, BOTTOM, AND VERTICAL EDGES USING LACING WIRE. WRAP THE WIRE WITH ALTERNATING SINGLE AND DOUBLE HALF-HITCHES AT INTERVALS BETWEEN FOUR (4) TO SIX (6) INCHES, UNLESS OTHERWISE SPECIFIED. LACING WIRE WILL BE THE ONLY FASTENER ALLOWED FOR INTERCONNECTING WOVEN MESH GABIONS. SPIRAL FASTENERS ARE COMMONLY USED FOR THE ASSEMBLY AND INTERCONNECTION OF WELDED MESH GABIONS. SPIRALS ARE SCREWED DOWN AT THE CONNECTING EDGES. THEN EACH END OF THE SPIRAL IS SECURELY TIED DOWN TO PREVENT UNRAVELING. LACING WAY BE USED AS NEEDED TO SUPPLEMENT THE INTERCONNECTION OF WELDED MESH GABIONS, AND THE CLOSING OF LIDS. FOR GABION LACING DETAILS, SEE EC-STR-57.

GABION CHECK DAM GENERAL NOTES (CONT.)

(M) UNLESS OTHERWISE SPECIFIED ON THE PLANS, THE VERTICAL JOINTS BETWEEN GABION BASKET UNITS OF ADJACENT LAYERS OR TIERS, ALONG THE LENGTH OF THE CHECK DAM, SHALL BE STAGGERED BY A MINIMUM OF ONE CELL.

(N) FILLING OPERATION

1. FOR REINFORCEMENT, INTERNAL CONNECTING WIRES SHALL BE PLACED IN EACH UNRESTRAINED GABION CELL 18 INCHES OR GREATER IN HEIGHT, INCLUDING GABION CELLS LEFT TEMPORARILY UNRESTRAINED. TWO INTERNAL CONNECTING WIRES SHALL BE PLACED (TWO ACROSS THE WIDTH AND TWO ACROSS THE LENGTH) CONCURRENTLY WITH ROCK PLACEMENT, AT THE SPECIFIED DEPTH INTERVAL SHOWN ON STANDARD DRAWING EC-STR-58. IN WOVEN MESH GABIONS THESE REINFORCING WIRES SHALL BE EVENLY SPACED ALONG THE FRONT FACE AND CONNECTING TO THE BACK FACE. ALL CONNECTING WIRES SHALL BE LOOPED AROUND TWO MESH OPENINGS AND EACH WIRE END SHALL BE SECURED BY A MINIMUM OF FIVE 180 DEGREE TWISTS AROUND ITSELF AFTER LOOPING.

2. IN WELDED MESH GABIONS, OPTIONAL CORNER STIFFENERS MAY BE USED IN LIEU OF INTERNAL CONNECTING WIRE REINFORCEMENT. WHEN USED, DIAGONAL STIFFENERS SHALL BE PLACED ACROSS THE CORNERS OF THE GABIONS AT 12 INCHES FROM CORNERS AS DETAILED ON STANDARD DRAWING EC-STR-58. LACING WIRE OR PREFORMED HOOKING WIRE STIFFENERS MAY BE USED.

3. THE GABIONS SHALL BE CAREFULLY FILLED WITH ROCK, EITHER BY MACHINE OR HAND METHODS, ENSURING ALIGNMENT, AVOIDING BULGES, AND PROVIDING A COMPACT MASS THAT MINIMIZES VOIDS. MACHINE PLACEMENT WILL REQUIRE SUPPLEMENTING WITH HAND WORK TO ENSURE THE DESIRED RESULTS. THE CELLS IN ANY ROW SHALL BE FILLED IN STAGES SO THAT THE DEPTH OF ROCK PLACED IN ANY ONE CELL DOES NOT EXCEED THE DEPTH OF ROCK IN ANY ADJOINING CELL BY MORE THAN 3 INCHES. ALONG THE EXPOSED FACES, THE OUTER LAYER OF STONE SHALL BE CAREFULLY PLACED AND ARRANGED BY HAND TO ENSURE A NEAT, COMPACT PLACEMENT WITH A UNIFORM APPEARANCE.

4. THE LAST LAYER OF ROCK SHALL BE UNIFORMLY LEVELED TO THE TOP EDGES OF THE GABIONS. LIDS SHALL BE STRETCHED TIGHT OVER THE ROCK FILLING USING ONLY APPROVED LID CLOSING TOOLS AS NECESSARY. THE USE OF CROWBARS OR OTHER SINGLE POINT LEVERAGE BARS FOR LID CLOSING IS PROHIBITED, AS THEY MAY DAMAGE THE BASKETS. THE LID SHALL BE STRETCHED UNTIL IT MEETS THE PERIMETER EDGES OF THE FRONT AND END PANELS. THE GABION LID SHALL THEN BE SECURED TO THE SIDES, ENDS, AND DIAPHRAGMS WITH SPIRAL BINDERS, INTERLOCKING WIRE, OVERLAPPING RING FASTENERS, OR LACING WIRE WRAPPED WITH ALTERNATING SINGLE AND DOUBLE HALF-HITCHES IN THE MESH OPENINGS.

(O) CARE SHOULD BE TAKEN WHEN PLACING ROCK IN GABIONS TO INSURE THAT THE GABION BASKETS WILL NOT BE DAMAGED OR BROKEN.

(P) ROCK OR STONE SIZE FOR USE IN GABION BASKETS SHALL BE NETWEEN 4 AND 8 INCHES WITH A D_{50} OF 6 INCHES (MINIMUM) AND SHALL CONSIST OF FIELD STONE OR ROUGH UNBROKEN QUARRY STONE. THE SPECIFIC GRAVITY OF INDIVIDUAL STONES SHALL BE A MINIMUM OF 2.5. STONES SHALL BE OF A QUALITY THAT WILL NOT DISINTEGRATE WITH EXPOSURE TO WATER OR WEATHERING.

(Q) GEOTEXTILE FABRIC (TYPE II) SHALL MEET REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR GEOTEXTILES AASHTO DESIGNATION M-288, EROSION CONTROL.

(R) GABION CHECK DAMS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:

709-05.06 MACHINE RIP-RAP (CLASS A-1) PER TON
709-10.01 GABIONS (DESCRIPTION) PER CUBIC YARD
709-10.02 GABIONS (DESCRIPTION) PER CUBIC YARD
709-10.03 GABIONS (DESCRIPTION) PER CUBIC YARD
709-10.04 GABIONS (DESCRIPTION) PER CUBIC YARD
709-10.05 GABIONS (DESCRIPTION) PER CUBIC YARD
740-10.03 GEOTEXTILE (TYPE II) (EROSION CONTROL) PER SQUARE YARD

PAYMENT SHALL INCLUDE ALL MATERIALS, EQUIPMENT, EXCAVATION, AND LABOR NECESSARY FOR CONSTRUCTION AND MAINTENANCE OF THE GABION CHECK DAMS.

(S) SEDIMENT SHALL BE REMOVED FROM BEHIND THE GABION CHECK DAMS WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE DAM AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL, PER CUBIC YARD.

(T) SEE STANDARD DRAWINGS EC-STR-55, EC-STR-56, EC-STR-57, AND EC-STR-58 FOR ADDDITIONAL DETAILS AND GENERAL NOTES NOT SHOWN ON THIS DRAWING.

GABION CHECK DAM COMPONENT PROPERTIES *

TYPE OF WIRE	MESH SIZE (INCHES)	U.S WIRE GAGE	GALVANIZED ZINC COATING (OZ/S.F.)	TOTAL DIAMETER WIRE WIRE (INCHES)
WOVEN (TWISTED) WIRE MESH	3.25 x 4.50	12	0.8	0.105
WELDED WIRE MESH	3.00 x 3.00	12	0.8	0.105
SELVEDGE	—	10	0.8	0.130
LACING WIRE	—	13.5	0.8	0.087
INTERNAL REINFORCING WIRE	—	13.5	0.8	0.087
SPIRAL BINDER	—	12	0.8	0.105

* ALL COMPONENTS SHALL BE HOT-DIPPED GALVANIZED STEEL (SEE NOTE F2 REGARDING WELDED MESH GABIONS).

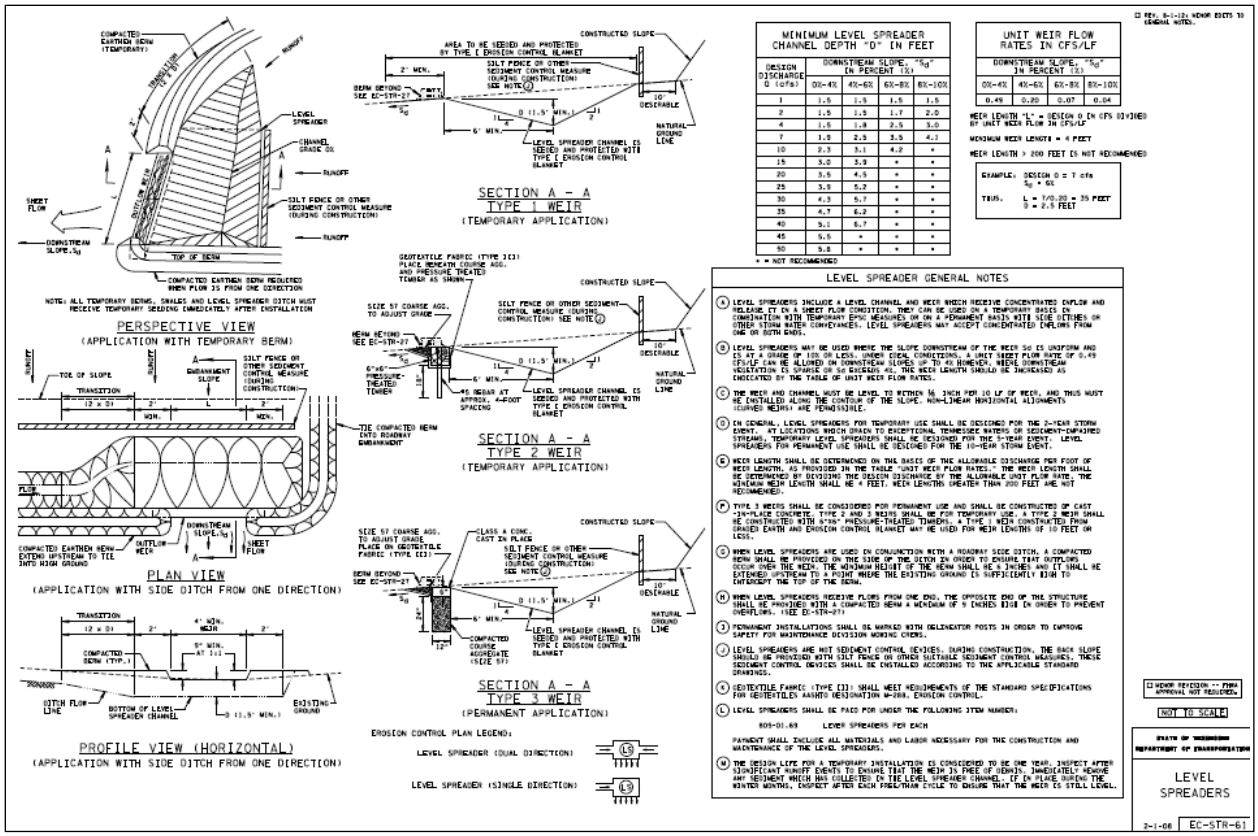
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

GABION CHECK DAM GENERAL NOTES AND COMPONENT PROPERTIES

7-29-04 | EC-STR-59



MINIMUM LEVEL SPREADER CHANNEL DEPTH "D" IN FEET

DESIGN DISCHARGE Q (cfs)	DOWNSTREAM SLOPE, "S_D" IN PERCENT (%)			
	0%-4%	4%-6%	6%-8%	8%-10%
1	1.5	1.5	1.5	1.5
2	1.5	1.5	1.7	2.0
4	1.5	1.8	2.5	3.0
7	1.9	2.5	3.5	4.1
10	2.3	3.1	4.2	*
15	3.0	3.9	*	*
20	3.5	4.5	*	*
25	3.9	5.2	*	*
30	4.3	5.7	*	*
35	4.7	6.2	*	*
40	5.1	6.7	*	*
45	5.5	*	*	*
50	5.8	*	*	*

* = NOT RECOMMENDED

UNIT WEIR FLOW RATES IN CFS/LF

DOWNSTREAM SLOPE, "S_D" IN PERCENT (%)			
0%-4%	4%-6%	6%-8%	8%-10%
0.49	0.20	0.07	0.04

WEIR LENGTH "L" = DESIGN Q IN CFS DIVIDED BY UNIT WEIR FLOW IN CFS/LF

MINIMUM WEIR LENGTH = 4 FEET

WEIR LENGTH > 200 FEET IS NOT RECOMMENDED

EXAMPLE: DESIGN Q = 7 cfs
S_D = 6%

THUS: L = 7/0.20 = 35 FEET
D = 2.5 FEET

LEVEL SPREADER GENERAL NOTES

(A) LEVEL SPREADERS INCLUDE A LEVEL CHANNEL AND WEIR WHICH RECEIVE CONCENTRATED INFLOW AND RELEASE IT IN A SHEET FLOW CONDITION. THEY CAN BE USED ON A TEMPORARY BASIS IN COMBINATION WITH TEMPORARY EPSC MEASURES OR ON A PERMANENT BASIS WITH SIDE DITCHES OR OTHER STORM WATER CONVEYANCES. LEVEL SPREADERS MAY ACCEPT CONCENTRATED INFLOWS FROM ONE OR BOTH ENDS.

(B) LEVEL SPREADERS MAY BE USED WHERE THE SLOPE DOWNSTREAM OF THE WEIR SO IS UNIFORM AND IS AT A GRADE OF 10% OR LESS. UNDER IDEAL CONDITIONS, A UNIT SHEET FLOW RATE OF 0.49 CFS/LF CAN BE ALLOWED ON DOWNSTREAM SLOPES OF TO 4%. HOWEVER, WHERE DOWNSTREAM VEGETATION IS SPARSE OR SO ENTICED AS, THE WEIR LENGTH SHOULD BE INCREASED AS INDICATED BY THE TABLE OF UNIT WEIR FLOW RATES.

(C) THE WEIR AND CHANNEL MUST BE LEVEL TO WITHIN ½ INCH PER 10 LF OF WEIR, AND THUS MUST BE INSTALLED ALONG THE CONTOUR OF THE SLOPE. NON-LINEAR HORIZONTAL ALIGNMENTS (CURVED WEIRS) ARE PROHIBITED.

(D) IN GENERAL, LEVEL SPREADERS FOR TEMPORARY USE SHALL BE DESIGNED FOR THE 2-YEAR STORM EVENT. AT LOCATIONS WHICH DRAIN TO EXCEPTIONAL TENNESSEE WATERS OR SEDIMENT-IMPAIRED STREAMS, TEMPORARY LEVEL SPREADERS SHALL BE DESIGNED FOR THE 5-YEAR EVENT. LEVEL SPREADERS FOR PERMANENT USE SHALL BE DESIGNED FOR THE 10-YEAR STORM EVENT.

(E) WEIR LENGTH SHALL BE DETERMINED ON THE BASIS OF THE ALLOWABLE DISCHARGE PER FOOT OF WEIR LENGTH, AS PROVIDED IN THE TABLE "UNIT WEIR FLOW RATES." THE WEIR LENGTH SHALL BE DETERMINED BY DIVIDING THE DESIGN DISCHARGE BY THE ALLOWABLE UNIT FLOW RATE. THE MINIMUM WEIR LENGTH SHALL BE 4 FEET. WEIR LENGTHS GREATER THAN 200 FEET ARE NOT RECOMMENDED.

(F) TYPE 3 WEIRS SHALL BE CONSIDERED FOR PERMANENT USE AND SHALL BE CONSTRUCTED OF CAST-IN-PLACE CONCRETE. TYPE 2 AND 3 WEIRS SHALL BE FOR TEMPORARY USE. A TYPE 2 WEIR SHALL BE CONSTRUCTED WITH 6"X6" PRESSURE-TREATED TIMBERS. A TYPE 1 WEIR CONSTRUCTED FROM GRADED EARTH AND EROSION CONTROL BLANKET MAY BE USED FOR WEIR LENGTHS OF 10 FEET OR LESS.

(G) WHEN LEVEL SPREADERS ARE USED IN CONJUNCTION WITH A ROADWAY SIDE DITCH, A COMPACTED BERM SHALL BE PROVIDED ON THE SIDE OF THE DITCH IN ORDER TO ENSURE THAT OUTFLOWS OCCUR OVER THE WEIR. THE MINIMUM HEIGHT OF THE BERM SHALL BE 9 INCHES AND IT SHALL BE EXTENDED UPSTREAM TO A POINT WHERE THE EXISTING GROUND IS SUFFICIENTLY HIGH TO INTERCEPT THE TOP OF THE BERM.

(H) WHEN LEVEL SPREADERS RECEIVE FLOWS FROM ONE END, THE OPPOSITE END OF THE STRUCTURE SHALL BE PROVIDED WITH A COMPACTED BERM A MINIMUM OF 9 INCHES HIGH IN ORDER TO PREVENT OVERFLOWS. (SEE EC-STR-27)

(J) PERMANENT INSTALLATIONS SHALL BE MARKED WITH DELINEATOR POSTS IN ORDER TO IMPROVE SAFETY FOR MAINTENANCE DECISION MAKING CREWS.

(J) LEVEL SPREADERS ARE NOT SEDIMENT CONTROL DEVICES, DURING CONSTRUCTION, THE BACK SLOPE SHOULD BE PROVIDED WITH SILT FENCE OR OTHER SUITABLE SEDIMENT CONTROL MEASURES. THESE SEDIMENT CONTROL DEVICES SHALL BE INSTALLED ACCORDING TO THE APPLICABLE STANDARD DRAWINGS.

(K) GEOTEXTILE FABRIC (TYPE II) SHALL MEET REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR GEOTEXTILES AASHTO DESIGNATION M-288, EROSION CONTROL.

(L) LEVEL SPREADERS SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:

805-01.69 LEVER SPREADERS PER EACH

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR THE CONSTRUCTION AND MAINTENANCE OF THE LEVEL SPREADERS.

(M) THE DESIGN LIFE FOR A TEMPORARY INSTALLATION IS CONSIDERED TO BE ONE YEAR. INSPECT AFTER SIGNIFICANT RUNOFF EVENTS TO ENSURE THAT THE WEIR IS FREE OF DEBRIS. IMMEDIATELY REMOVE ANY SEDIMENT WHICH HAS COLLECTED IN THE LEVEL SPREADER CHANNEL. IF IN PLACE DURING THE WINTER MONTHS, INSPECT AFTER EACH FREEZE/THAW CYCLE TO ENSURE THAT THE WEIR IS STILL LEVEL.

☐ REV. 6-1-12: MINOR EDITS TO GENERAL NOTES.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

LEVEL SPREADERS

2-1-08 EC-STR-61

VITA

Ali Hangul was born in Balikesir, Turkey to the parents of Ozcan and Mary Hangul. He is the first of 3 children: Cynthia and Cem. He attended MHK High School in Balikesir, Turkey. He obtained bachelors of Science degree from University of Uludag at Turkey in in March 1988 in Civil Engineering. He has been working as a Civil Engineer since 1989. His previous experiences are with Ebasco Services Inc., and Reytheon Engineering in Nuclear Energy Sector. He has been working for the TN Department of Transportation since 1996. He worked for the Structures Division for 9 years. Since 2005 he has been managing the Standards and Policies office at TDOT HQ. Currently, he has been working as an Assistant Director for the HQ Roadway design Division and serving on several national committees such as National Academy of Science, Transportation Research Board' AFB20-Roadside Safety, AASHTO Subcommittee on Design. Ali received a Professional Engineering License in 2002. He has been a Certified Professional in Erosion and Sediment Control as well as completed LEAD Tennessee, Government Leadership Academy in 2010.