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STATE-OF-THE-PRACTICE: EVALUATION OF SEDIMENT BASIN DESIGN, CONSTRUCTION, MAINTENANCE, AND INSPECTION PROCEDURES

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ABSTRACT

The following document is the summary of results from a survey that was conducted to evaluate the state-of-the-practice for sediment basin design, construction, maintenance, and inspection procedures by State Highway Agencies (SHAs) across the nation. The survey consisted of 68 possible questions in six categories: A. *Background and Experience*, B. *Design*, C. *Construction*, D. *Maintenance of Sediment Basins during Construction*, E. *Inspection and Monitoring*, and F. *Lessons Learned.* A total of 37 responses were received and analyzed. The responses included 37 SHAs (74% response rate) out of a total of 50 SHAs.

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SUMMARY OF SURVEY RESULTS

The objective of this report is to document the results from a survey conducted to determine the state-of-the-practice for sediment basin design, construction, maintenance, and inspection techniques employed by state highway agencies (SHAs) in the U.S.

The survey consisted of 68 possible questions in six categories: A. *Background and Experience*, B. *Design*, C. *Construction*, D. *Maintenance of Sediment Basins during Construction*, E. *Inspection and Monitoring*, and F. *Lessons Learned*. Most of the questions were structured in a multiple choice format. Several of the multiple choice questions allowed respondents to check more than one answer if it applied to their agency, therefore the sum of some percentages may exceed 100%. Comment boxes were included on some questions to allow respondents to further explain or clarify individual responses. The entire 68 question survey that was administered can be found in Appendix A. The survey was electronically distributed via Qualtrics® survey software (an online survey software that emails each participant a unique link to access the survey electronically) in August of 2011. A total of 37 responses (74% response rate) were received from SHAs as illustrated in Figure 1.

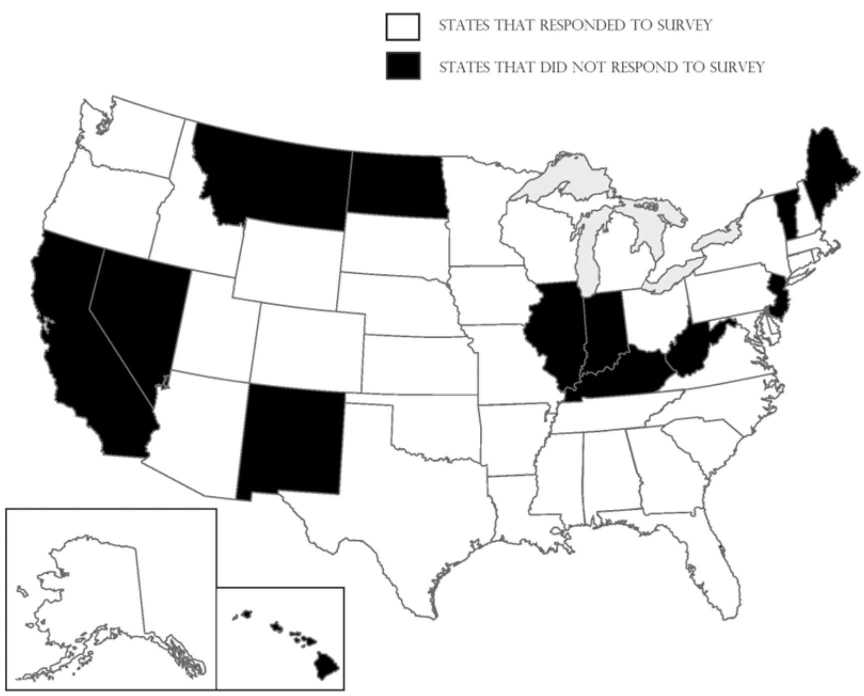


Figure 1: State Highway Agencies that Responded to the Survey.

The findings presented herein are based on responses received regarding each SHAs experiences with sediment basin design, construction, maintenance, and inspection techniques. The survey is part of a research project that the Highway Research Center (HRC) at Auburn University is conducting in partnership with the Alabama Department of Transportation (ALDOT) to identify issues, considerations, costs, and performance characteristics of sediment basins. The survey gathered information pertaining to sediment basin design factors, construction techniques, maintenance regimes, and inspection methods commonly employed by SHAs. The following sections will discuss the analysis and results of the survey.

Basin Usage

Sedimentation basins (or more commonly, sediment basins) are a best management practice (BMP) used on projects involving earth disturbance activities to minimize the amount of sediment leaving a site and entering receiving waters (Bidelspach and Jarrett 2004). Sediment basins are impoundment structures designed to receive sediment-laden stormwater runoff and provide an opportunity for the removal of suspended sediment. This process is achieved by detaining the water long enough for the suspended sediment to settle from the water under the influence of gravity before the water is discharged to the uncontrolled environment (Fennessey and Jarrett 1997; Millen, Jarrett et al. 1997).

Sediment ponds and detention ponds have shown approximately an 85% removal efficiency of suspended solids (Petterson, German et al. 1999; Bentzen, Larsen et al. 2009). The removal efficiency of sedimentation control devices depends on factors such as the intensity and duration of storm events, topography and extent of construction sites, soil type, the amount of vegetative cover, and the system of other structural and nonstructural BMPs implemented on-site (Line and White 2001).

Of the 37 responding agencies, 4 agencies (11%) indicated that they did not use or do not have any experience with sediment basins, as shown in Figure 2. Thirty-three agencies (89%) did have experience, and of those, 24 agencies (73%) have a standard design drawing for sediment basins and provided a link allowing access to view. These design drawings are located in APPENDIX B: STANDARD DESIGN DRAWINGS BY STATE.

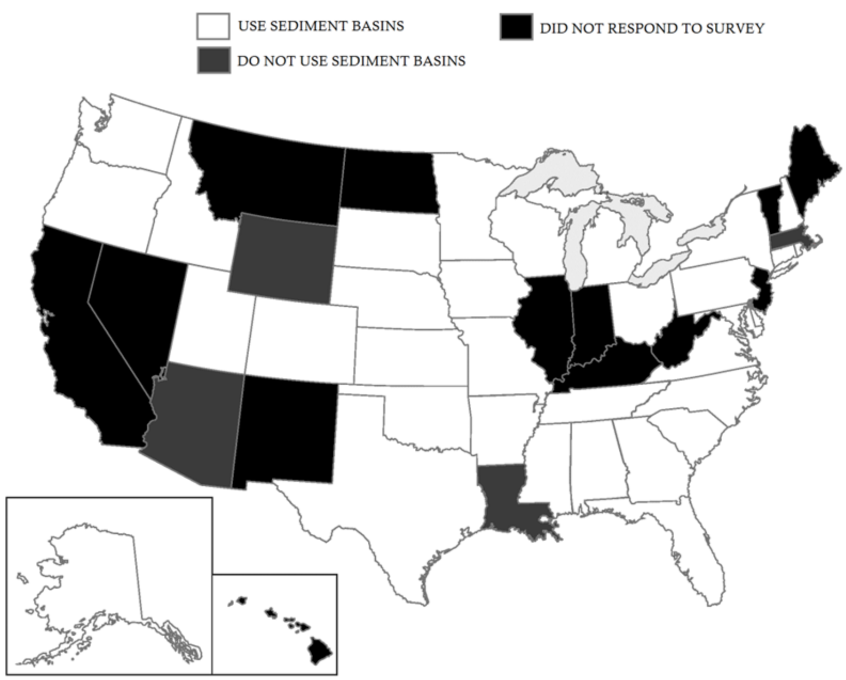


Figure 2: Use of Sediment Basins among Responding Agencies.

As shown in Figure 3, of the 33 agencies that use sediment basins, the majority reported that the average life of a sediment basin on an active construction site was 6 to 12 months (45%) followed by 1 to 2 years (30%). The responding agencies reported that sediment basins were most commonly used in areas where large amounts of earth disturbing activities typically occur such as: cut sections (85%), followed by fill sections (76%), and transition sections (73%). When terrain on a project site limits the storage capacity of a single sediment basin and additional capacity is required, SHAs consider constructing smaller sediment basins in series. Twenty-one agencies (64%) reported they either use or sometimes use basins in series. The most common method for connecting sediment basins constructed in series was by spillways (81%) and pipes (52%). Other reported means of connecting sediment basins in series included using open channels, ditches, and swales.

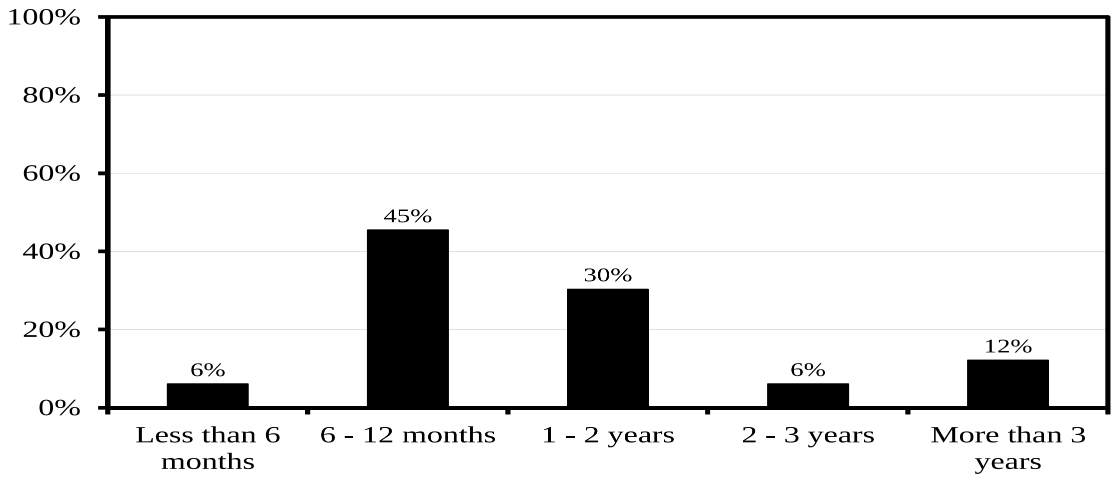


Figure 3: Typical Design Life of Sediment Basins Used on Roadway Projects.

Basin Design

A few major parameters must be carefully considered when designing a sediment basin. One such parameter is the sizing of the basin. The usual methods of regulating sediment basins are through performance standards, which specify effluent concentrations, and/or hydraulic design standards (Millen, Jarrett et al. 1997). According to hydraulic standards, sufficient volume must be provided to store the sediment-laden stormwater runoff so that the suspended sediments have time to settle from the water prior to discharge (Millen, Jarrett et al. 1997; Bidelspach, Jarrett et al. 2004). According to previous design standards, the size of the basin was 1,800 cubic feet per acre of disturbed area within the contributing drainage area flowing into the basin. This provided for a sediment basin to have sufficient volume to capture 0.5 inch of runoff per acre of disturbed area (NCDOT 2006). This standard has recently been increased to 3,600 cubic feet per acre of disturbed area, or 1.0 inch of runoff per acre of disturbed area being captured for sediment basins that serve an area with 10 or more disturbed acres at one time (Kalainesan, Neufeld et al. 2008). Seventeen agencies (52%) use a minimum storage volume of 3,600 cubic feet per acre of drainage for the design of sediment basins, whereas 6 agencies (18%) use a minimum storage volume of 1,800 cubic feet per acre. The remaining 10 agencies either have no minimum storage volume requirements or have project specific requirements based upon agency design procedures. Sizing a basin solely on the 1,800 or 3,600 cubic feet per acre standard procedure sometimes results in insufficient sediment storage volume in the basin leading to sediment resuspension and release through the basin outlet during storm events, increasing the concentration of particulate contaminants leaving the basin (Madaras and Jarrett 2000; Thaxton and McLaughlin 2005; Glenn and Bartell 2008; Kalainesan, Neufeld et al. 2009).

The Environmental Protection Agency (EPA) recommends that the ratio of the length of flow path to the effective width be greater than 2:1(Madaras and Jarrett 2000). Figure 4, below, illustrates the minimum and maximum length to width ratios of the 33 responding agencies. Nineteen agencies (58%) use 2:1 as their minimum length to width ratio, and 20 agencies (61%) do not have a maximum length to width ratio. Fifteen agencies (25%) neither have a minimum nor maximum depth used for the design of sediment basins. Of the responding agencies, 61% and 67% do not have minimum nor maximum allowable slopes for the inflow channel, respectively. Based on these responses, it is apparent that most agencies do not have established standards regarding minimum or maximum values for basin depth and inflow channel slopes. Most likely these elements are considered separately based upon project specific related characteristics when designing sediment basins for use on a project.

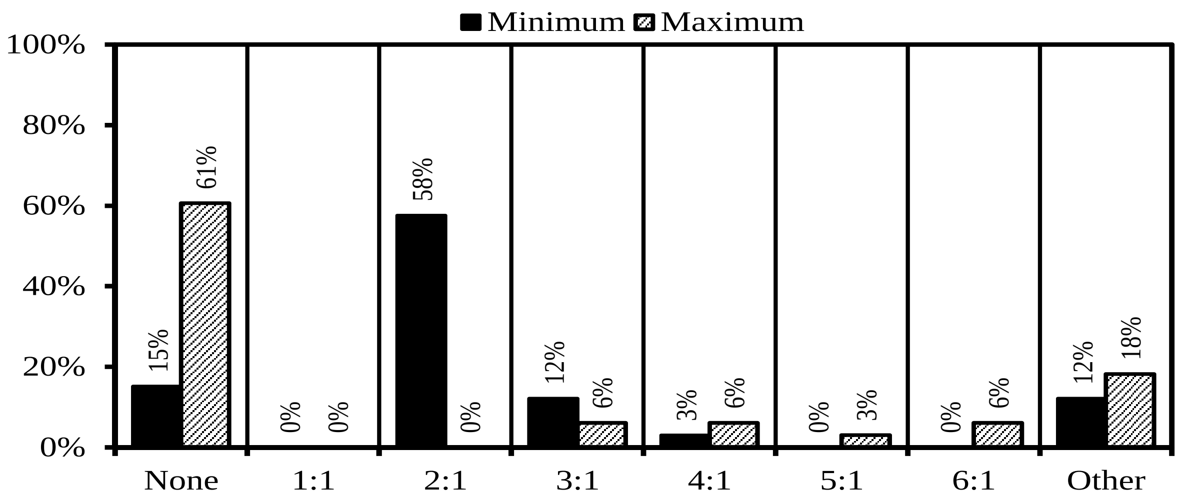


Figure 4: Minimum and Maximum Length to Width Ratios Typically used by SHAs.

To size a basin properly, one must determine the particular design storm event that is being considered for the site. The most common storm events that are factored into sediment basin design are 2, 5, 10, 25, 50, and 100 year storms. These storms are determined by the National Oceanic and Atmospheric Administration (NOAA) for each state taking into account the return period, the probability of that storm occurring, (i.e., 30 min, 1, 2, 3, 6, 12, or, 24-hr) based on historical data. Sixteen agencies (48%) design sediment basins for a 2-yr, 24-hr rainfall event followed by 6 agencies (18%) that use a 10-yr, 24-hr rainfall event and 6 agencies (18%) that do not size basins based on a particular storm event. Using the precipitation intensity estimates, provided by NOAA, for the nearest location to the sediment basin, the volume of runoff generated within the drainage area for the selected design storm can be calculated; and a basin volume is determined. To properly calculate the runoff volume of sediment-laden stormwater for the design storm, the contributing watershed area for the sediment basin must also be determined. Twenty agencies (61%) do not have a minimum watershed area used for sediment basin design, and 17 agencies (52%) do not have a maximum watershed area used for sediment basin design. However, most responding SHAs size sediment basins to capture runoff from disturbed areas ranging from 10 to 100 acres.

Flocculants

Flocculant additives are typically used in an area upstream of the sediment basin in the inflow channel to promote coagulation and settling of fine suspended particles. These often perform well with clayey soils and other similar soils containing very fine particles. Of the 33 agencies that have experience with sediment basins, 13 agencies (39%) use flocculant additives as shown in Figure 5. Typical products used as flocculant additives are polyacrylamide (PAM) floc blocks, liquid PAM concentrate, granular PAM, and Chitosan. Survey results show that 11 (85%) of the agencies that use flocculant additives prefer using PAM floc blocks.

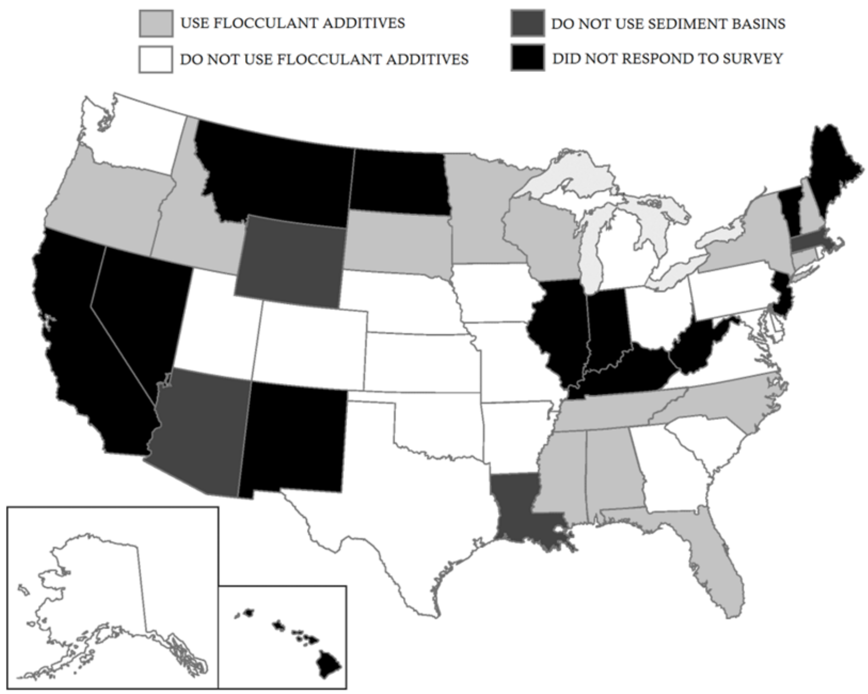


Figure 5: Use of Flocculant Additives among Responding Agencies.

Baffles

Baffles are used in sediment basins for multiple reasons, but primarily to dissipate energy of inflow, reduce the likelihood of short-circuiting, and promote settling when flocculants have been added to the inflow of sediment-laden stormwater runoff. The survey results show that there are 16 agencies (48%) that use baffles within sediment basins, as shown in Figure 6. Of the 16 agencies that use baffles, 7 agencies (44%) use silt fence material closely followed by 5 agencies (31%) that use coir fiber net material for baffles as shown in Figure 7. Nine agencies (56%) do not recommend a predetermined number of baffles for use within a sediment basin. The most common response for baffle spacing was that their agency has no set standard for baffle spacing (38%), closely followed by dividing the total length of the basin equally (31%). Other agencies indicated that the baffle spacing is dependent on the size and shape of the basin which is dictated by site specific constraints. The most common baffle placement selected is perpendicular to flow entering the basin (56%), while 25% of agencies install baffles perpendicular to the flow and include staggered openings in an effort to increase the flow path through the basin.

The primary reasons provided by 17 SHAs (52%) for not using baffles in sediment basins include: their agency not having standard drawings/specifications for inclusion of baffles, site specific criteria, no regulatory guidance on use, found them unnecessary, or it is optional where the contractor may elect to use if deemed necessary.

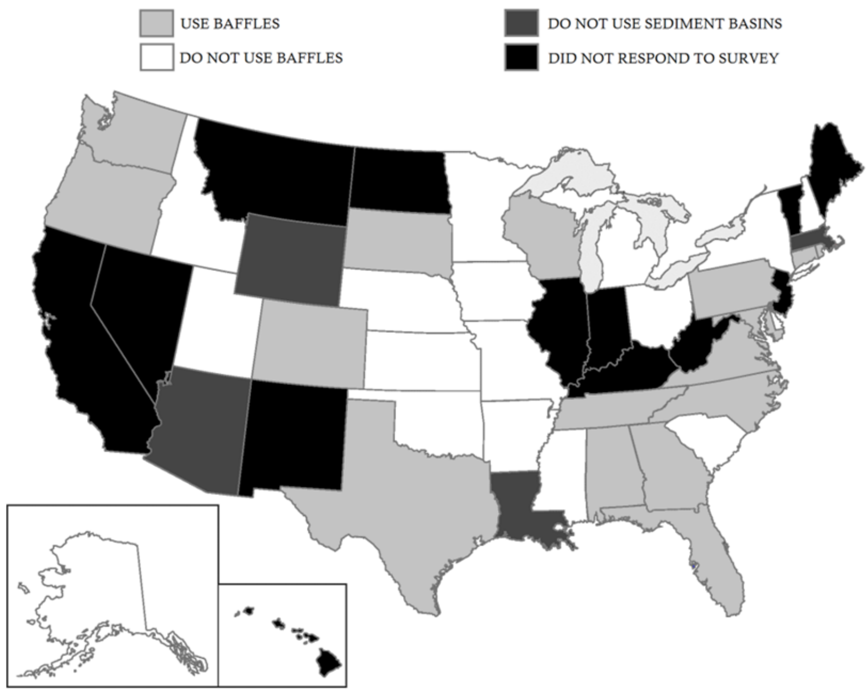
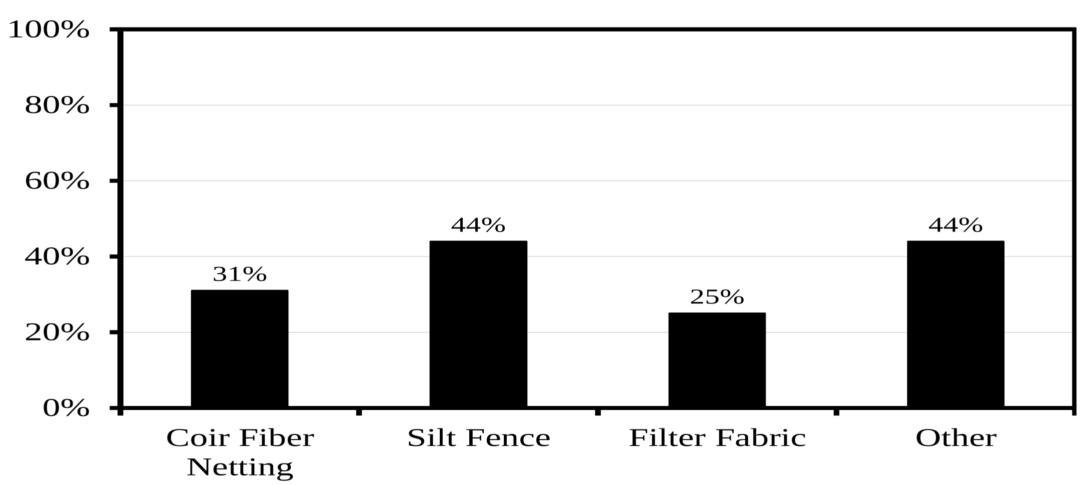


Figure 6: Use of Baffles among Responding Agencies.



Note: Other types of materials include: plywood and sheeting piling, earthen or rip rap berms, wood, and concrete jersey barrier.

Figure 7: Types of Materials used for Baffles.

Dewatering Devices

Various types of dewatering devices are used to control the dewatering of sediment basins, allowing the proper residence time for suspended particles to settle before discharging the effluent. The nature of a sediment basin provides the cleanest water at the top of the water column, as gravity is allowing for suspended sediment to settle to the bottom of the basin. Therefore, dewatering devices that discharge water from the top of the water column within the basin maximize the efficiency of the sediment basin. The least expensive, most desirable, and most common form of dewatering a basin is through gravitational dewatering. Riser pipes and floating skimmers are the most common type of principle spillway that relies on gravitational dewatering. There are three common types of risers used for basin dewatering: (1) solid risers, (2) perforated risers, and (3) flashboard risers. Each dewatering device performs differently, as solid riser pipes and flashboard risers only discharge water from a fixed elevation of a fixed orifice with variable head. Perforated risers discharge water from the entire water column via perforations in the pipe at a variable rate. Floating skimmers discharge water from the top of the water column at a fixed rate with a fixed head and orifice size. As seen in Figure 8 the most common dewatering devices used among SHAs were perforated riser pipes (70%), spillways only (58%), floating skimmers (33%), and solid riser pipes (30%). Of the 33 agencies having experience with sediment basins, only 13 agencies (33%) use skimmers as dewatering devices as shown in Figure 9. Research has shown that the skimmer is the most efficient dewatering device available due to its characteristic dewatering capability from only the top of the water column (McCaleb and McLaughlin 2008). Twenty agencies (61%) specify a minimum dewatering time of 1 day or less and 24 agencies (73%) specify no maximum dewatering time in the design of sediment basins. The most common sizing of a spillway for a sediment basin is based on the flow rate for a 2-yr, 24-hr rainfall event (33%) closely followed by a 10-yr, 24-hr rainfall event (30%). Thirty agencies (91%) indicated that they do not use discharge control valves on the outlet pipes of sediment basins for increasing detention times and/or controlling effluent discharge.

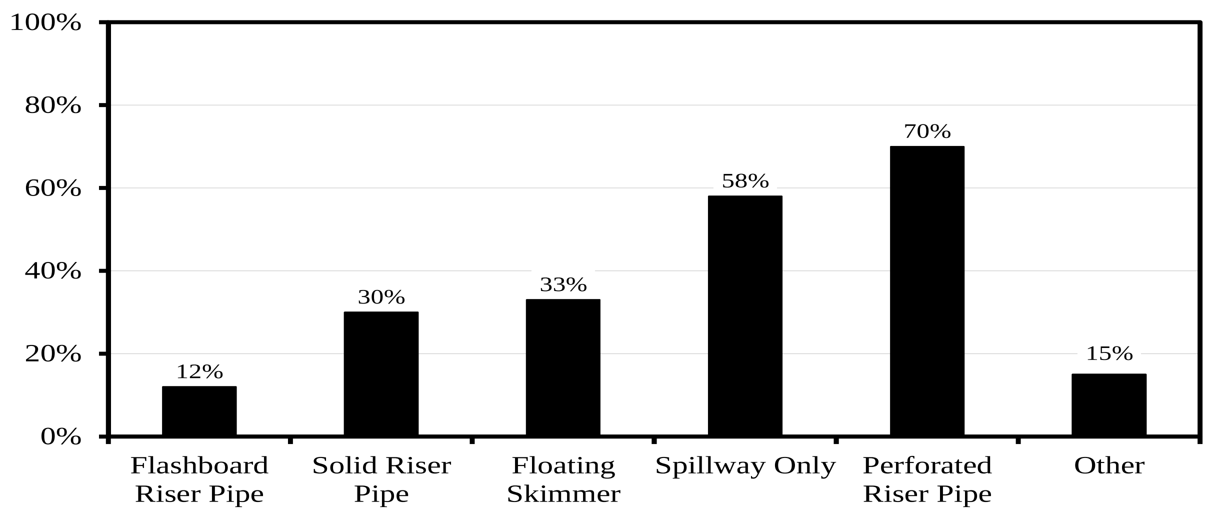


Figure 8: Use of Dewatering Devices among Responding Agencies.

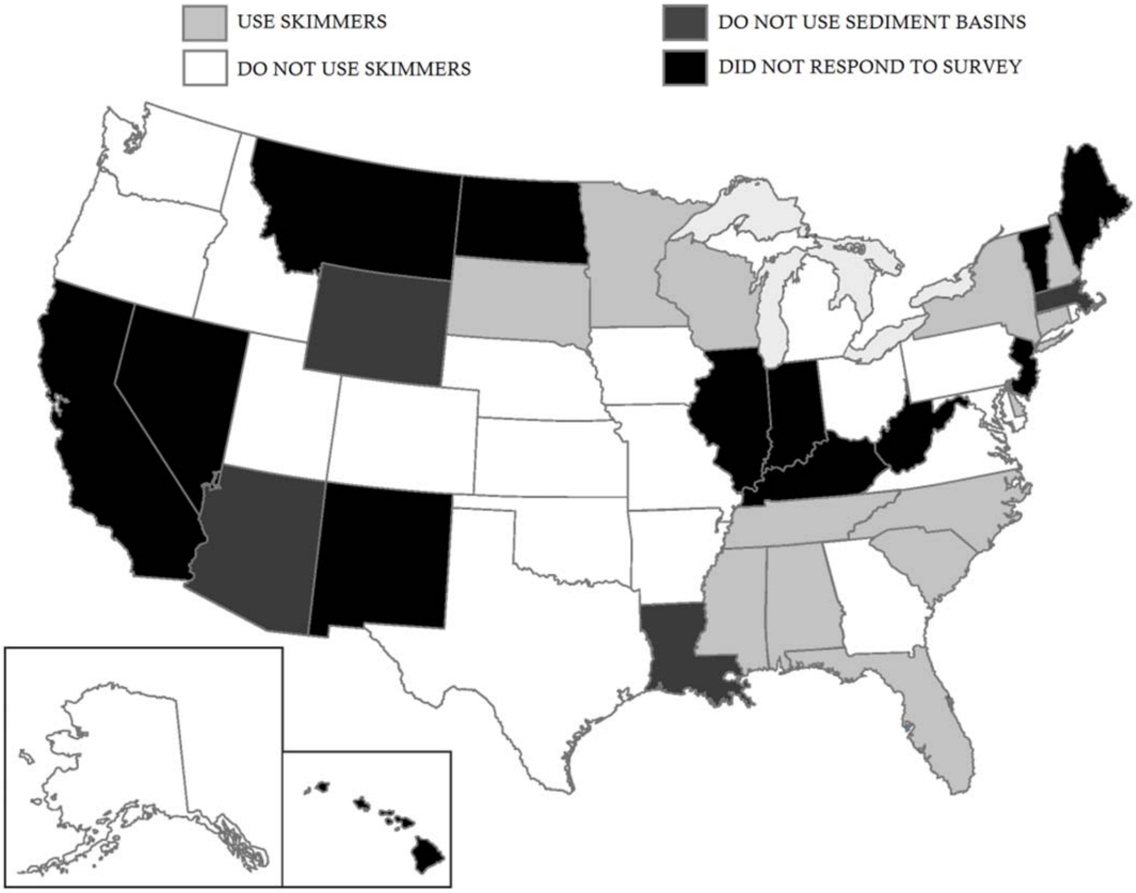


Figure 9: Use of Skimmers among Responding Agencies.

Combination Use of Features

This survey has observed 7 agencies of the 33 responding (21%) across the country use flocculants, baffles, and floating skimmer devices in combination when employing sediment basins on a project in an effort to improve its efficiency. Based upon previous research conducted by McLaughlin et al. (2009), the combined use of such features can improve sediment basin efficiency by 82 to 85 percent for TSS and by 77 to 88 percent for turbidity, depending on location and site conditions. Figure 10 illustrates other combination of features used by SHAs responding to the survey.

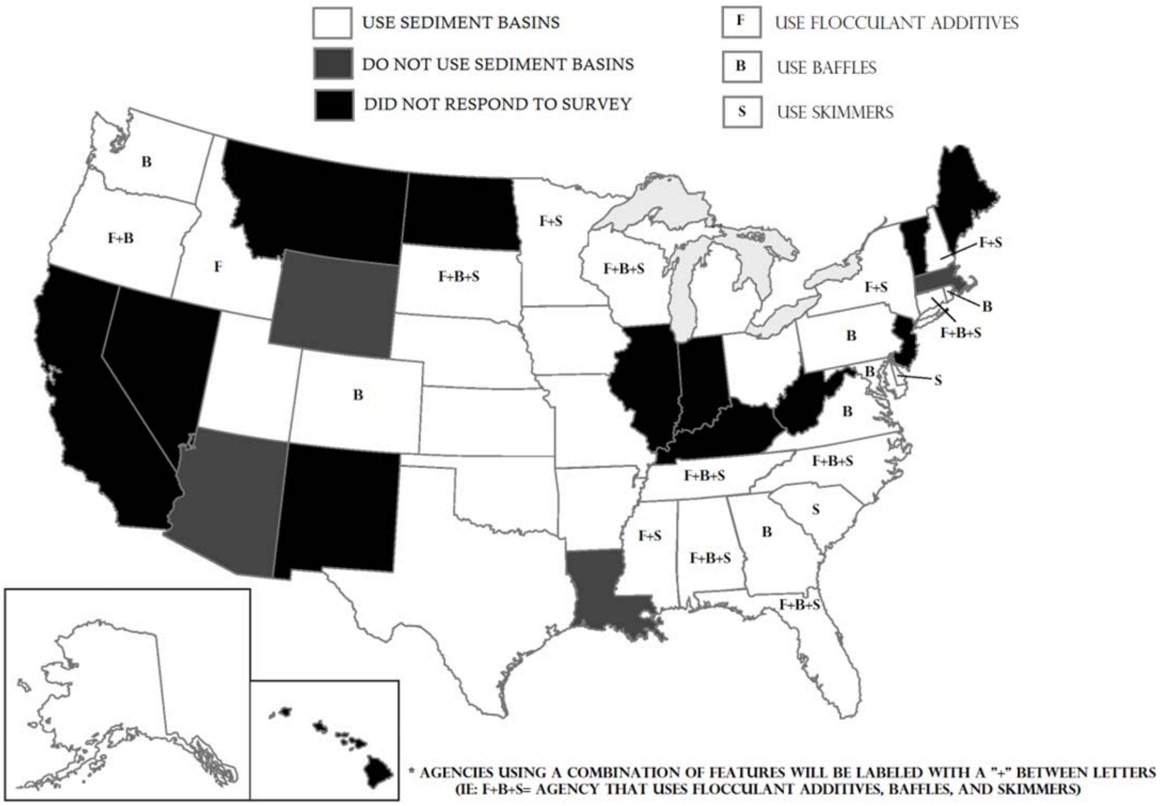


Figure 10: Use of Sediment Basin Features among Responding Agencies.

Sediment Basin Construction

Constructing a sediment basin on a construction project is imperative to maximizing the sediment reduction in stormwater runoff. Fourteen agencies (42%) typically begin constructing sediment basins either during or immediately following clearing and grubbing activities. Maintaining the usefulness of a sediment basin throughout the life of a construction project will allow for the least amount of sediment to be discharged in receiving bodies of water. As shown in Figure 11, the most common average service life of a sediment basin on a (1) large project (75+ acres) is more than 12 months (67%); (2) medium project (25–75 acres) is more than 12 months (52%); (3) small project (0–25 acres) is more than 12 months (40%).

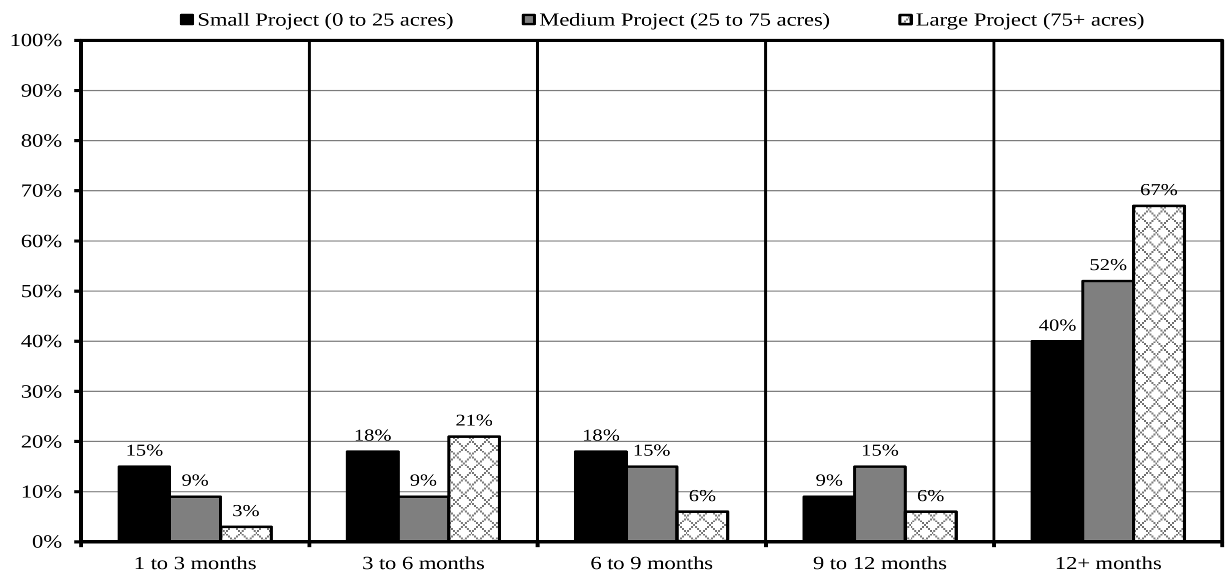


Figure 11: Average Service Life of Sediment Basins among Responding Agencies

Pre-treating stormwater runoff prior to entering the inflow channel of sediment basins often improves the efficiency of sediment basins due to the lower amount of suspended sediment entering the basin. Practices used to promote the settling of larger sediment particles prior to reaching the basin include ditch checks, sumps, and sumps followed by ditch checks. Twenty-one agencies (64%) use ditch checks, followed by 10 agencies (30%) that use an excavated sump w/ditch check as inflow control devices for sediment basins. Of the agencies that use an excavated sump w/ditch check, the most common material for the ditch check is rock (100%).

There are several different means that agencies may use to enable a level of protection for various aspects of a sediment basin (i.e. inflow channel, interior/exterior side slopes, basin bottom, spillway, etc.) so these areas do not become secondary sources of sediment because of erosion. Figure 12 illustrates the responding agencies' level of use of the various types of protection measures for various sediment basin components. The most commonly selected measures of protection used by responding agencies in the construction of a sediment basin include rip rap, rolled erosion control products (RECPs), and seeded ground, as indicated in Figure 12 by asterisks (*). The objective of these practices is to stabilize the various components to maintain the integrity, functionality, and performance of the basin itself. Other areas such as sumps and the basin floor are typically left unprotected since these areas are intended to collect accumulated sediment and will require future dredging/maintenance activities. One agency indicated that they use temporary plastic slope drain pipes across extreme elevation changes to divert surface runoff from slopes, preventing them from eroding prior to the establishment of vegetation.

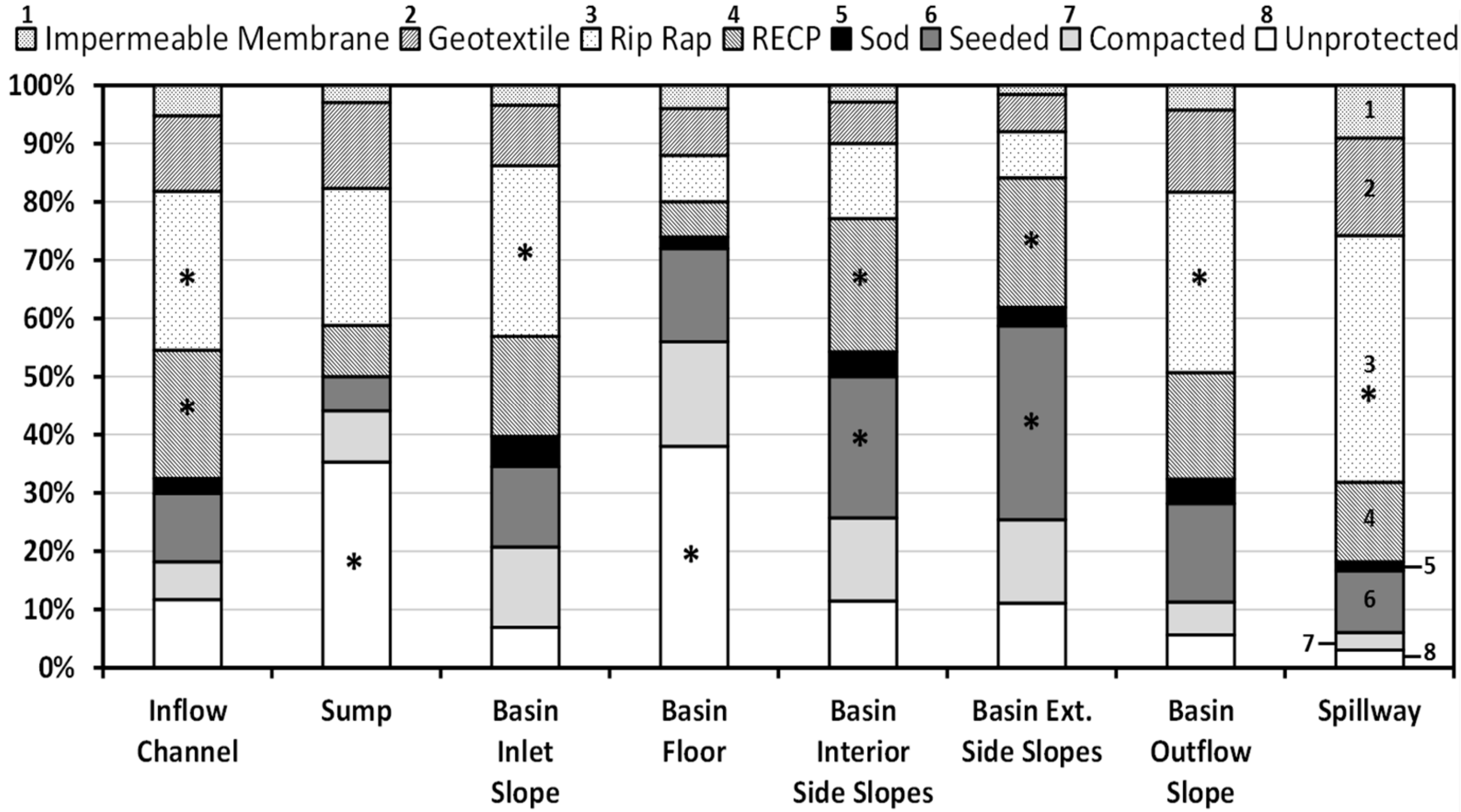


Figure 12: Protection Measures Used in the Construction of Sediment Basins. The Asterisks Indicate the Most Commonly Selected Measures of Protection for Different Aspects of a Sediment Basin.

Allowing a sediment basin to be active throughout the entirety of a construction project, or until sediment loss is no longer an issue in stormwater runoff, maximizes the basin's effects on sediment removal. Twenty agencies (61%) remove basins during construction once final site stabilization has been achieved. Only 7 agencies (21%) have experienced any issues with sediment basin removal, mostly having to do with saturated subgrade materials, contaminated sediment, or disturbance to surrounding areas resulting in an erodible condition.

Sediment Basin Maintenance

In order for a sediment basin to function properly, it must be properly maintained throughout its effective life on the project. All 33 agencies (100%) having experience with sediment basins recommend that maintenance be performed on sediment basins during construction (i.e., when in active use). As depicted in Figure 13, the most influential factors in the determination of performing maintenance on sediment basins were captured sediment volume (88%), rainfall depth (80%), and rainfall intensity (73%); however, the least influential factors were life cycle costs (40%) and effluent turbidity (30%).

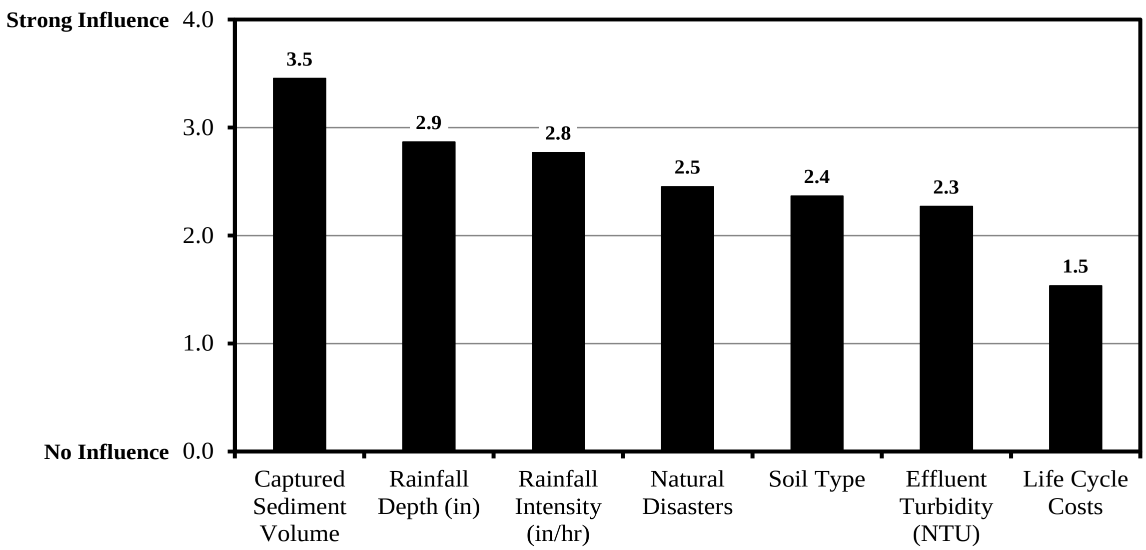


Figure 13: Most Influential Factors in Performing Sediment Basin Maintenance.

It is important to have a pre-established protocol in which maintenance activities are performed on a sediment basin in a timely fashion so that the sediment basin efficiency is not compromised. Twenty-four agencies (73%) determine that sediment cleanout should be performed at the point when the sediment basin loses 50% of its storage capacity. Almost all agencies indicated that sediment removed during the clean-out of basins is disposed of on-site in areas deemed suitable by the project engineering. If the sediment is considered a suitable material it would be placed and spread on-site and seeded as appropriate. If it was considered unsuitable soil, it would be placed in a designated waste area or disposed of off-site.

Maintaining baffles within a sediment basin is a very important factor in sustaining the effectiveness of the basin. However, almost two thirds (63%) of the agencies that use baffles do not require the contractor to replace baffles during the active lifespan of a sediment basin. Of the agencies that do require contractors to replace baffles, the most common circumstance requiring replacement is if damage occurs during a rain event (100%) and when baffles become "clogged" with sediment (83%), basically rendering the baffles ineffective. Twenty-eight agencies (85%) have not recognized a need to perform maintenance on the basin floor after sediment removal.

Sediment Basin Inspection and Monitoring

In order for agencies to determine the effectiveness of sediment basins, ensure effluent discharge meets EPA guidelines, and know when to check maintenance needs, it is important for sediment basins to be regularly inspected and monitored based on several factors. Common types of inspection and monitoring performed by agencies on sediment basins include sediment depth (36%), rainfall depth (24%), and sediment volume retained (21%); however, 16 agencies (48%) do not monitor sediment basin data (e.g., turbidity of effluent discharge). The only agency that monitors effluent discharge is the North Carolina Department of Transportation, observing the average discharge turbidity to be 1000+ NTU on basins without skimmers and 250 to 500 NTU on basins with skimmers.

Lessons Learned

The last section of this survey provided an area for each responding agency to provide a link to their specifications pertaining to sediment basins, problems encountered with the use of sediment basins, along with lessons learned and suggestions on how sediment basin use and efficiency can be improved. Twenty-three agencies (70%) having experience with sediment basins provided a link to their agency's specification for sediment basins. Based on past experiences, 26 agencies expressed specific problems encountered when using sediment basins which are summarized in Table 1. The most common problems that were expressed deal with limited right of way (ROW) availability and enforcing proper installation and maintenance by contractors.

Table 1: Problems Experienced by Agencies Employing Sediment Basins on Construction Sites.

- Lack of detailed design to install basins in most effective locations on the project
- Improper design or timing or installation
- Controlling effluent turbidity
- Problems containing clayey particles (sediment particles being too fine to settle)
- Problems occur when topography prevents proper size, L/W ratio, and placement of basins
- Difficulty and timing associated with ROW acquisition and utility relocation
- Slope stability issues
- Basins being constructed/installed smaller than shown on project plans
- Subgrade failure, breach of side berm and outlet control erosion
- Contractors put too much faith in the basins to work properly, and become less diligent in the use of erosion and sediment control elsewhere in the drainage area
- Smaller basins fill up quickly when contractor is not keeping up with maintenance during site stabilization
- Poor maintenance results in basin failure
- Contractors opening basins to let them drain faster
- Lack of maintenance and monitoring during construction

Also based on past experiences, 22 agencies provided suggestions on what, in their opinion, would improve the efficiency and use of sediment basins on construction projects, and 23 agencies provided positive practices or designs that they recommend for the use of sediment basins. Such suggestions and positive practices or designs have been summarized in Table 2. Suggestions for improvement provided by SHAs primarily focused on the need for properly designed sediment basins for each application, increasing the basin size versus contributing area ratio, and the increasing the usage of PAM with sediment basins. Recommendations on the use of sediment basins provided by SHAs focused on combining sediment basins with other BMPs in order to maximize basin efficiency, ensuring proper basin stabilization before any use of the basin ensuring that basins are properly sized in accordance with the largest possible contributing drainage area, and inspecting basins frequently and ensuring punctual and proper maintenance occurs.

Table 2: Lessons Learned by Agencies Employing Sediment Basins on Construction Sites.

Category:	Suggestions for Improving the Effectiveness of Sediment Basins
Design	▪ Ensure adequate right-of-way is acquired to allow for proper design, sizing, and locations of basins to improve efficiency ▪ Sediment basins should be specifically designed for each individual application ▪ Use sediment traps upstream of sediment basins to capture larger particles. Note that maintenance activities will be required ▪ Increase the use of PAM, ensuring proper type and dosage in each application ▪ Provide an increased emphasis on erosion control and other best management practices in addition to the use of sediment basins. Agencies cannot rely on sediment basins alone. The treatment train of practices will be needed to reach effluent discharge limitations established by regulatory agencies
Construction	▪ Ensure sediment basins are constructed according to plan, not allowing for contractor deviations to cut cost ▪ Install the basin as early in the project as clearing and grubbing allows ▪ Ensure basin features (e.g., inflow channels, side slops, and basin bottoms) are fully stabilized before use of a sediment basin ▪ Mandate the grading process be performed in stages and require the contractor to provide a plan to open and close-out areas, thereby reducing the total amount of the contributing drainage area
Maintenance	▪ Continued monitoring and performance evaluations could provide valuable information with respect to improvements ▪ Increase the amount and detail of sediment basin inspections and provide contractors with a strict and detailed maintenance program ▪ Poor installation and maintenance results in basin failures

Conclusion

The objective of this survey was to establish the state-of-the-practice nationwide in regards to how SHAs are using sediment basins on highway construction projects. Though a majority of the responding SHAs use sediment basins as a sediment control measure, there is a wide variety in practices being used for the construction, maintenance, and inspection of sediment basins, each showing different levels of experience with successes and limitations to overcome. Often considered to be a leader in the industry, NCDOT has been referred to as the agency for being on the cutting edge of erosion and sediment control practices. However, not all states can directly benefit from NCDOT research and technology by copying the NCDOT protocol, as soil types, topography, and geographic considerations play a large role in decision making for sediment basin designs and applications. Therefore many states use different systems of erosion and sediment control BMPs that best suit the conditions in that state. In addition to soil types, some of the different practices may be attributed to rainfall intensity and frequency, and ROW availability.

The results of this survey are intended to better facilitate for an open line of communication between responding agencies in an effort for the agencies to work collectively and improve each agency's use of sediment basins. Significant findings from this survey show that the typical design life of a sediment basin lifespan is between 6 months and 2 years. The generally accepted minimum storage volumes among most agencies is 3,600 cubic feet per acre of disturbed area draining to the basin, and most agencies do not have a limit on the maximum watershed area for sediment basin design. In addition, most states use a 2:1 length to width ratio in basin design but do not have a standard maximum length to width ratio. Seventy-five to eighty percent of all responding agencies did not specify a minimum or maximum value for inflow channel slope. Perforated risers are the most commonly used dewatering device, though it has been proven to be inefficient due to the fact that it dewaters the entire water column at once. No agencies use valves on their dewatering devices as a standard practice. Thirteen agencies (39%) out of the responding agencies having experience with sediment basins use flocculant additives to enhance the efficiency of sediment basins. The use of baffles within sediment basin is split among the responding agencies, however most agencies that do use baffles do not require contractors to maintain or replace them during the active use of the basin.

All responding agencies with sediment basin experience recommended that basin maintenance should be performed, and 85% of those recommend that basin cleanout should occur when the sediment basin loses 50% or less of its storage capacity. Most importantly, it is notable that few agencies actually monitor or collect data from sediment basins. For agencies to improve upon current sediment basin designs and functionality, it will be important to monitor and collect basin data to gain an in-depth understanding of overall sediment basin performance and effectiveness.

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APPENDIX A: SURVEY RESULTS

I. BACKGROUND | EXPERIENCE

QUESTION 2: *Does your agency use sediment basins on construction projects to capture sediment-laden runoff and promote sedimentation prior to effluent discharge?*

Total Responses	YES	NO
37	33	4
100%	89%	11%

II. DESIGN

QUESTION 3: *Does your agency have a standard design/drawing for sediment basins?*

Total Responses	YES	NO
33	24	9
100%	73%	27%

QUESTION 4: *Please provide a link to the standard design/drawing.*

http://www.iowadot.gov/erl/current/RS/content_eng/rl9.pdf
http://www.michigan.gov/documents/2006_SESC_Manual_165226_7.pdf
http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/soil_water/erosion_control/
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http://www.dnrec.state.de.us/DNREC2000/Divisions/Soil/Stormwater/New/Delaware%20ESC%20Handbook_06-05.pdf
http://www.okladot.state.ok.us/roadway/roadway2009/r04.pdf
http://standarddetails.dot.ga.gov/stds_dtls/files/gcded22.tif
http://www.dot.state.oh.us/Divisions/Engineering/Hydraulic/Standard%20Drawings/DM/PDF/dm43_apr09_V8.pdf
http://www.itd.idaho.gov/design/StandardDrawings.htm#P
https://www.dot.ny.gov/main/business-center/engineering/cadd-info/drawings/standard-sheets-us-repository/209-07_090210.pdf
http://www.coloradodot.info/business/designsupport/standard-plans/m-s-standards-plans-list-sheet
www.arkansashighways.com/roadway_design_division/usunits/57--tec-2.pdf
http://www.modot.mo.gov/business/standards_and_specs/documents/80610.pdf
http://roadwaystandards.dot.wi.gov/standards/fdm/10-15-005att.pdf
or for contractors http://dnr.wi.gov/runoff/pdf/stormwater/techstds/erosion/SedimentBasin_1064.pdf
http://www.scdot.org/doing/pdfs/stddrawings/new_2011/sd11-01_800_Incidental_Construction.pdf
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http://www.dot.state.al.us/dsweb/EngineeringSupport/pdf/1170up2spec_031111.pdf
ftp://ftp.odot.state.or.us/techserv/Geo-Environmental/Environmental/Procedural%20Manuals/Erosion%20Control%20Manual/Chapter%203.pdf
http://kart.ksdot.org/StandardDrawings/_us_published_pdfs/la852a.pdf
http://dotapp7.dot.state.mn.us/edms/download?docId=914121

QUESTION 5: *The average design life of a sediment basin on an active construction site used by your agency is approximately:*

Total Responses	< 6 Months	6 - 12 Months	1 - 2 years	2 - 3 years	> 3 Years
33	2	15	10	2	4
100%	6%	45%	30%	6%	12%

QUESTION 6: *Your agency uses sediment basins in: (select all that apply)*

Total Responses	Cut Sections	Fill Sections	Transition Sections
33	28	25	24
100%	85%	76%	73%

QUESTION 7: *Does your agency use basins in series where terrain limits storage capacity of a single sediment basin?*

Total Responses	YES	NO	Sometimes
33	10	12	11
100%	30%	36%	33%

QUESTION 8: *You selected that your agency uses or sometimes uses sediment basins in series. How are these basins connected to each other?*

Total Responses	Pipes	Skimmers	Spillways	Other
21	11	2	17	4
100%	52%	10%	81%	19%

Other (Please Specify):

(IA) Ditch
(NY) Swales
(OH) Open Channel
(WA) Swales

QUESTION 9: *The minimum storage volume that your agency uses in the design of sediment basins is:*

Total Responses	1,800 cubic ft per acre	3,600 cubic ft per acre	Other
33	6	17	10
100%	18%	52%	30%

Other (Please Specify):

(FL) Depends on design parameters

(IA) 1,500 cubic feet/acre

(ID) 2 year 24 hour storm event. Sediment accumulation is not calculated. Many local municipalities do require a foot of "free board" in the design of sediment basins. This "free board" is to account for the accumulation of sediment and reduced future infiltration due to sediment accumulation. Common methods used to determine the volume for the 2 year 24 hour storm are the Rational Method and TR-55, which do account for vegetated cover and infiltration. Typically only the portion of the watershed contributing to the basin would be included, but Idaho does not have a formal watershed approach to stormwater design….yet.

(MI) Not determined by runoff

(MO) 3,600 cubic feet per installation

(RI) Specific design criteria determines volume of storage over time

(TX) 2,500 CF/acre (based on 25-yr flood event for region)

(UT) No Minimum

(WA) Surface area of 2080 square feet per cfs of inflow with a minimum 3.5 depth

(WI) No Minimum

QUESTION 10: *The minimum watershed area used by your agency for a sediment basin design is:*

Total Responses	No Minimum	1 acre	2 acres	3 acres	4 acres	Other
33	20	3	1	1	1	7
100%	61%	9%	3%	3%	3%	21%

Other (Please Specify):

(KS) 10 acres. We don't really have a minimum, but we require sediment basins where we have ten or more disturbed acres draining to a single point, and since the contractor is the one putting together the erosion control plan, we don't typically see sediment basins if they are not required.

(MI) not determined by acres

(MO) 10 acres

(OH) 10 acres

(OK) unknown

(PA) 5 acres

(SC) 10 acres

QUESTION 11: *The maximum watershed area used by your agency for a sediment basin design is:*

Total Responses	No Maximum	Up to 10 acres	Up to 20 acres	Up to 30 acres	> 30 acres
33	17	7	1	1	7
100%	52%	21%	3%	3%	21%

> 30 (Please Specify):

(CT) Dependent on project site location
(DE) 100 acres
(MI) Not determined by acres
(NY) 100 acres
(PA) 100 acres
(TN) 50 acres
(VA) 100 acres (allowed by regulations)

QUESTION 12: *Your agency most often sizes sediment basins for a __-year 24-hour rainfall event.*

Total Responses	2	10	20	Other
33	16	6	0	11
100%	48%	18%	0%	33%

Other (Please Specify):

(IA) Not used.
(KS) We don't really size the sedimentation basins. That is up to the contractor, putting together the erosion control plan with the requirement of 3,600 cu ft/ acre.
(MI) Not used.
(MO) Varies by installation and available right of way
(NC) 10 Yr & 20 Yr Depending on Water Quality Designation
(NY) Not used. (volume per acre only)
(OH) Not used.
(PA) Not used.
(RI) 100 year 24 hour event not including free board
(UT) Not used.
(VA) 25 year peak discharge

QUESTION 13: *The minimum length/width ratio used by your agency in the design of sediment basins is:*

Total Responses	None	1:1	2:1	3:1	4:1	Other
33	5	0	19	4	1	4
100%	15%	0%	58%	12%	3%	12%

Other (Please Specify):

(FL) No minimum required; length maximized for efficiency.
(MD) Formula calculations per state standards.
(RI) Depends on site constraints.
(SD) Depends on site-constraints.

QUESTION 14: *The maximum length/width ratio used by your agency in the design of sediment basins is:*

Total Responses	None	3:1	4:1	5:1	6:1	Other
33	20	2	2	1	2	6
100%	61%	6%	6%	3%	6%	18%

Other (Please Specify):

(FL) No maximum; length maximized for efficiency
(CO) Depends on site-constraints.
(ID) 2:1 is a general guideline
(MD) Formula calculations per state standards
(RI) Depends on site-constraints.
(SD) Depends on site-constraints.

QUESTION 15: *The minimum depth your agency uses for sediment basin design is:*

Total Responses	No Minimum	4 ft	3 ft	2 ft	Other
27	20	2	2	1	2
100%	74%	7%	7%	4%	7%

Other (Please Specify):

(AR) 3.5 ft
(FL) No minimum required. (depth targeted for expected load)
(MD) 2.5 ft
(MI) Site specific criteria determines sizing.
(RI) Site specific criteria determines sizing.
(UT) 1 ft
(WA) 3.5 ft

QUESTION 16: *The maximum depth your agency uses for sediment basin design is:*

Total Responses	No Maximum	5 ft	10 ft	15 ft	Other
33	15	4	1	4	9
100%	45%	12%	3%	12%	27%

Other (Please Specify):

(AR) 6' for basin w/spillway only or perforated riser pipe; 5' for sump basin
(CO) 3.5 ft
(FL) No maximum required. (depth targeted for expected load)
(MI) Site specific criteria determines sizing.
(MO) 1 foot plus design flow depth.
(RI) Site specific criteria determines sizing.
(SD) Design for 2' - 3' depths wherever possible.
(TN) No maximum. Dams that are more than 20 ft in height must meet the Tennessee Safe Dam Act.
(VA) No maximum specified but typically try to limit depth to 5' or less.

QUESTION 17: *The minimum allowable slope that your agency uses for the inflow channel of a sediment basin is:*

Total Responses	1%	2%	3%	4%	Other
33	4	2	0	1	26
100%	12%	6%	0%	3%	79%

Other (Please Specify):

(AR) None
(CO) Level – No Slope
(DE) 0.5%
(FL) None; Designed for efficient site conditions.
(IA) None
(ID) None
(KS) None
(MD) 2:1
(MI) None
(MN) None; Depends on soil
(MO) None; Varies by installation
(MS) None
(NC) None
(NH) 0.5%
(NY) None
(OH) None - Site Specific
(OK) None
(PA) None
(SC) 0.5%
(TN) None
(TX) None
(UT) None
(VA) None
(WA) None; minimum velocity is 3 feet per second
(WI) None

QUESTION 18: *The maximum allowable slope that your agency uses for the inflow channel of a sediment basin is:*

Total Responses	1%	5%	10%	15%	Other
33	0	5	2	0	26
100%	0%	15%	6%	0%	79%

Other (Please Specify):

(AL) None
(AR) None
(CO) 50%
(DE) No maximum; Basically using anything that would eliminate gullying and sediment generation. (i.e. use of riprap chutes/swales)
(FL) None; Designed for efficient site conditions
(IA) None
(ID) None
(KS) None
(MD) 2:1
(MI) None
(MN) None; Depends on soil
(MO) None; Varies by installation
(MS) 2:1 slope
(NC) None
(NH) None
(NY) None
(OH) None – Site Specific
(OK) None
(PA) None
(TN) None
(TX) None
(UT) None
(VA) None
(WA) None; Maximum velocity of 10 feet per second
(WI) None

QUESTION 19: *What types of dewatering devices does your agency use in sediment basins to discharge effluent? (select all that apply)*

Total Responses	Solid Riser Pipe	Perforated Riser Pipe	Flashboard Riser Pipe	Floating Skimmer	Spillway Only	Other
67	10	23	4	11	19	5
100%	15%	34%	6%	16%	28%	7%

Other (Please Specify):

(DE) Usually use a floating skimmer, but minimum requirement is: "Dewatering shall be done in such a manner as to remove relatively clean water without removing any of the sediment that has settled out and without removing any appreciable quantities of floating debris."
(IA) Note: Perforated riser pipe is not in standard yet.
(MD) Horizontal and Vertical Draw Down Devices
(OH) Note: Solid Riser/Perforated Riser and Spillway
(RI) Weir style outlet structures

QUESTION 20: *The minimum dewatering time that your agency uses in the design of a sediment basin is:*

Total Responses	< 1 day	1 day	2 days	3 days	> 3 days
33	10	10	4	1	8
100%	30%	30%	12%	3%	24%

> 3 days (Please Specify):

(FL) None – designed for efficiency
(IA) None
(MI) None
(MS) None
(OK) None
(SD) As construction allows…dependent on soil.
(TN) Dependent on size of basin.
(WA) None

QUESTION 21: *The maximum dewatering time that your agency uses in the design of a sediment basin is:*

Total Responses	No Maximum	3 days	4 days	5 days	> 5 days
33	24	5	0	0	4
100%	73%	15%	0%	0%	12%

> 5 days (Please Specify):

(DE) Some sediment basins will be designed with a permanent pool elevation.
(PA) 7 days
(SD) As construction allows…dependent on soil.
(TN) Dependent on size of basin.

QUESTION 22: *Your agency typically sizes the spillway of a sediment basin for a __-year 24-hour rainfall event.*

Total Responses	2	10	20	25	Other
33	11	10	0	4	8
100%	33%	30%	0%	12%	24%

Other (Please Specify):

(IA) Not based on rainfall event.
(KS) No requirement other than a min 10 foot width.
(MI) Undefined.
(MO) Varies by installation.
(OH) Undefined.
(PA) 2 cfs/acre.
(RI) 100 year 24 hour event.
(UT) Undefined.

QUESTION 23: *Does your agency use valves on the outlet pipes of sediment basins for controlling effluent discharge?*

Total Responses	YES	NO	Sometimes
33	0	30	3
100%	0%	91%	9%

QUESTION 24: *In the previous question, you selected that your agency uses or sometimes uses valves on the outlet pipes of sediment basins. Please explain how your agency uses valves.*

(AL) As a backup measure at the end of the outlet pipe.
(NH) To control the release of construction stormwater runoff.
(NY) NYSDOT may sometimes use a valve in its outlet structure when there is a need to contain the entire contents of the basin, meaning no chance of discharge unless valve is open, or if there is a concern for a material from a fuel spill draining into the basin.

QUESTION 25: *Does your agency use flocculant additives with sediment basins to promote deposition?*

Total Responses	YES	NO
33	13	20
100%	39%	61%

QUESTION 26: *What kind of additive does your agency use? (select all that apply)*

Total Responses	Polyacrylamide (PAM) floc blocks	Liquid PAM	Granular PAM	Other
13	11	6	8	3
100%	85%	46%	62%	23%

Other (Please Specify):

(ID) Chitosan
(MN) Chitosan
(NC) Bi-Polymers and Other products on the market that are approved by NC Water Quality

QUESTION 27: *Does your agency use baffles in sediment basins?*

Total Responses	YES	NO
33	16	17
100%	48%	52%

QUESTION 28: *Primarily what type of material does your agency use for baffles? (select all that apply)*

Total Responses	Coir fiber net	Silt fence	Filter fabric	Other
23	5	7	4	7
100%	22%	30%	17%	30%

Other (Please Specify):

(CO) Concrete jersey barrier
(CT) Rip rap berm
(GA) Wood
(MD) 1/2" Exterior Grade Plywood
(PA) Plywood and sheet piling
(RI) Earthen or rip rap berm
(VA) Plywood

QUESTION 29: *How many baffles does your agency recommend for use in a sediment basin?*

Total Responses	1	2	3	4	Other
16	4	0	3	0	9
100%	25%	0%	19%	0%	56%

Other (Please Specify):

(CT) As needed according to residence storage time and volume determined by performing flood routing using approximate methods in detention basin measurement (TR-55).
(FL) Site dependant.
(GA) Potentially more (than 4) to lengthen the flow path.
(MD) Formula in Md. Dept. of Environment, Water Management Admin. Spec. Detail 18, page C-10-28.
(PA) As needed to achieve min. 2L:1W flow ratio.
(TN) Dependent on size.
(TX) Varies among installations.
(VA) Typically one continuous to achieve desired length to width ratio.
(WI) No recommendation.

QUESTION 30: *In what way does your agency determine the spacing between baffles in sediment basins?*

Total Responses	Divide total length of basin equally	Divide basin into 4 "chambers", with an inlet zone which makes up 35% of basin surface area (BSA), first and second chamber which makes up 25% each of BSA, and an outlet zone which makes up 15% of BSA.	Baffle spacing is dependent on the length of the sediment basin	Our agency has no set standard for baffle spacing	Other
16	5	0	3	6	2
100%	31%	0%	19%	38%	13%

Other (Please Specify):

(CT) The forebay must hold 10% of total for sediment load clean out.
(MD) Formula in Md. Dept. of Environment, Water Management Admin. Spec. Detail 18, page C-10-28.

QUESTION 31: *In the previous question, you selected, "Baffle spacing is dependent on the length of the sediment basin." Please explain.*

(FL) Contractor is responsible for the design of the basin.
(NC) Of coir fiber mat attached to steel T-posts to be 5 ft. in height (3 ft. above ground) in the basin or storage area. Install 3 baffles in the erosion control device at a spacing of ¼ the basin length, but if basin length is less than 20 ft., only 2 baffles need to be installed at a spacing of 1/3 the basin length.
(RI) Site specific design criteria determine the basin size and shape, therefore any baffle spacing as well.

QUESTION 32: *In what arrangement does your agency recommend that the baffles be placed in the sediment basin?*

Total Responses	**Perpendicular to flow**	**Perpendicular to flow with staggered openings**	**Other**
16	9	4	3
100%	56%	25%	19%

Other (Please Specify):

(MD) Formula in Md. Dept. of Environment, Water Management Admin. Spec. Detail 18, page C-10-28.

(PA) We do not have any guidance on how they are placed.

(VA) Parallel to inflow to increase flow length.

QUESTION 33: *In question 27, you selected that your agency "does not use baffles" in sediment basins. Why?*

(AK) Not needed.

(DE) Baffles are not typically used at present as all of our sediment basins will be converted into permanent stormwater management facilities. When the new DNREC regulations go into effect in January, temporary sediment basins will be required on projects that disturb more than 10 acres in any phase. Under the temporary sediment basin spec in the DNREC E&S Handbook (pg. 3.1.4-1), baffles would be required to achieve the minimum flow path length of a basin shape of length to width ration of 2 to 1.

(IA) Have not tried yet. Likely will take up more space.

(ID) No design guidelines from regulatory agencies.

(KS) Our designs are very minimal. In fact, generally they are done by the contractor thus it is not something that we see used.

(MI) Department policy.

(MN) Usually they are smaller basins. We have used them on site specific and the baffles would be coir or burlap.

(MO) We have not found them to be necessary.

(MS) Our standards haven't been updated to include them at this time.

(NE) No requirements to decrease turbidity.

(NH) Our agency often times uses locations for permanent water quality basins/ detention basins as temporary sediment basins during construction. The basin volumes are designed for the 10-year design storm and are cleaned, as necessary, to maintain adequate storage volume. I do not believe that we have constructed any baffles in our sediment basins.

(NY) Not required by state standards. NYSDOT is not aware of research findings that quantify the benefits of baffles, nor appropriate design criteria.

(OH) It's site specific design developed by the Contractor's registered Engineer.

(OK) Haven't evolved to that requirement yet.

(SC) Have not found the need to use them.

(UT) The use of baffles is not specifically required and is not mentioned in the standard specification. However, they can be used if desired.

III. CONSTRUCTION

QUESTION 34: *In the project sequence of construction, when does your agency typically begin constructing sediment basins on projects?*

Total Responses	Prior to clearing and grubbing	Following clearing and grubbing	During road bed construction	Following road bed construction	Other
33	11	14	5	0	3
100%	33%	42%	15%	0%	9%

Other (Please Specify):

(AK) Project dependant
(RI) Project dependant
(TN) Project dependant

QUESTION 35: *Typically what is the average service life of a sediment basin on a _____?*

Question	< 1 month	1 - 3 months	3 - 6 months	6 - 9 months	9 - 12 months	> 12 months	Total Responses
Large Project (75+ acres)	0%	3%	21%	6%	6%	67%	33
Medium Project (25 - 75 acres)	0%	9%	9%	15%	15%	52%	33
Small Project (0 - 25 acres)	0%	15%	18%	18%	9%	40%	33

QUESTION 36: *What type of inflow control devices does your agency allow for a sediment basin? (select all that apply)*

Total Responses	Excavated Sump	Ditch Check	Excavated Sump w/ditch check	Other
50	9	21	10	10
100%	18%	42%	20%	20%

Other (Please Specify):

(AK) None
(CO) None
(DE) Pretty much anything that would eliminate gullying and sediment generation.
(IA) None
(KS) Whatever the contractor chooses, which is generally nothing.
(MD) None
(MI) None
(NC) Slope Drain Pipe
(PA) None
(RI) Site constraints determine inflow device. Permanent vs. temporary sediment basin also determines inflow device and sizing.

QUESTION 37: *What type of ditch check device does your agency use in combination with an excavated sump? (select all that apply)*

Total Responses	Rock	Wattle	Silt fence	Other
15	10	2	1	2
100%	67%	13%	7%	13%

Other (Please Specify):

(MS) sand bags
(NY) triangular silt dikes, fiber (coir) rolls

QUESTION 38: *What types of ditch check devices does your agency use? (select all that apply)*

Total Responses	Rock	Wattle	Silt fence	Other
45	21	11	7	6
100%	47%	24%	16%	13%

Other (Please Specify):

(AR) Sand Bags
(MN) Wood fiber
(MO) Proprietary devices
(MS) Sand bags, hay bales, triangle silt dikes
(NY) Triangular silt dikes, fiber (coir) rolls
(WI) Bales, triangular silt dike

QUESTION 39: *What type of protection measures does your agency recommend be used for the following areas of a sediment basin? (select all that apply)*

Question	Natural Ground / Unprotected	Compacted Embankment	Seeded Ground	Sod	Rolled Erosion Control Product	Riprap Stone	Geotextiles	Impermeable Membrane	Other	Total Responses
Inflow Channel	27%	15%	27%	6%	52%	64%	30%	12%	3%	3
Sump	36%	9%	6%	0%	9%	24%	15%	3%	0%	3
Basin Inlet Slope	12%	24%	24%	9%	30%	52%	18%	6%	0%	3
Basin Floor	64%	27%	24%	3%	9%	12%	12%	6%	0%	3
Basin Interior Side Slopes	24%	30%	52%	9%	48%	27%	15%	6%	0%	3
Basin Exterior Side Slopes	21%	27%	64%	6%	42%	15%	12%	3%	3%	3
Basin Outflow Slope	12%	12%	36%	9%	39%	67%	30%	9%	0%	3
Spillway	6%	6%	21%	3%	27%	85%	33%	18%	0%	3

QUESTION 40: *You selected "other" for protection measures used on the inflow channel. Please list the other measures your agency uses here:*

(NC) We may use plastic slope drain pipe for extreme elevation changes.

QUESTION 41: *You selected "other" for protection measures used on the basin interior side slopes. Please list the other measures your agency uses here:*

(VA) Stabilization mulch for exterior slopes

QUESTION 42: *At what stage of construction are sediment basins removed?*

Total Responses	Temporary site stabilization	Final site stabilization	Other	Sediment basins are not removed (converted to permanent basins)
33	2	20	4	7
100%	6%	61%	12%	21%

Other (Please Specify):

(KS) It varies from project to project, when they are no longer required.

(NH) Project-dependant.

(SD) Site-specific.

(WI) Could be at any time, when done using.

QUESTION 43: *Has your agency ever experienced any issues with sediment basin removal?*

Total Responses	YES	NO
33	7	26
100%	21%	79%

Please list all notable issues experienced by your agency in the removal of sediment basins:

(AL) Accessibility over finished slopes.

(CO) Saturated subgrade

(ID) History of basin failure reaching waters of the US

(MD) Basin was designed in the foot print of the new roadway. When contractor was ready to remove the basin and continue with roadway cut and fill operations, the drainage area was not directed to an appropriate sediment control. Issues had to be resolved with proper approvals from MDE and SHA.

(NC) - Disturbance to surrounding areas when basin is removed results in erodible condition.

- Stabilizing the disturbed area after removal during times of the year when vegetation establishment is difficult to achieve.

- Inability to reach the location of the basin to have it removed due to topography.

(OH) Slope stability, contaminated sediment, erodible embankments

(OR) Disposal of material. Establishment of vegetation after removal.

III. MAINTENANCE OF SEDIMENT BASINS DURING CONSTRUCTION

QUESTION 44: *Does your agency recommend that maintenance be performed on sediment basins during construction?*

Total Responses	YES	NO
33	33	0
100%	100%	0%

QUESTION 45: *How much do the following factors influence the decision for your agency to perform maintenance on sediment basins?*

Question	Strong Influence	Influential	Neutral	Low Influence	No Influence	Total Responses
Soil Type	27%	27%	23%	3%	20%	30
Rainfall Depth (in)	27%	53%	10%	0%	10%	30
Rainfall Intensity (in/hr)	30%	43%	13%	0%	13%	30
Effluent Turbidity (NTU)	19%	27%	31%	8%	15%	26
Captured Sediment Volume	67%	21%	6%	3%	3%	33
Natural Disasters	29%	26%	26%	0%	19%	31
Life Cycle Costs	0%	21%	39%	11%	29%	28
Other	40%	40%	20%	0%	0%	5

Other (Please Specify):

(CO) Location to proposed roadway. (Neutral)

(DE) As with our normal E&S inspection practices, the basin would be inspected weekly as well as after any rain event that is 1/2" depth or greater. (Strong Influence)

(KS) The contractor is required to maintain the sedimentation basin and clean it when the sediment level reaches a certain height. (Strong Influence)

(MI) Must be maintained to contain sediment. (Influential)

(NY) Significance of receiving waterbody. Maintenance may be done more frequently (or at least greater attention paid to proper maintenance) if the discharge is to a 303d list waterbody or in a TMDL watershed, or if the waterbody has other special local sensitivity. (Influential)

QUESTION 46: *At what point does your agency determine that sediment cleanout should be performed? (select all that apply)*

Total Responses	When basin loses 20% storage capacity	When basin loses 30% storage capacity	When basin loses 40% storage capacity	When basin loses 50% storage capacity	Other
36	3	4	0	24	5
100%	8%	11%	0%	67%	14%

Other (Please Specify):

(AR) As directed by the engineer.

(NH) When basin fills to original design capacity of 3600 CF/acre.

(RI) Basin size and sediment load determine maintenance schedule.

(VA) When basin loses 25% of its capacity

(WI) When not functioning properly

QUESTION 47: *Does your agency require the contractor to replace baffles during the active lifespan of a sediment basin?*

Total Responses	YES	NO
7	3	4
100%	43%	57%

QUESTION 48: *Under what circumstances does your agency require replacement of baffles in a sediment basin? (select all that apply)*

Total Responses	If damage occurs during a rain event	When baffles become 'clogged' with sediment	During basin cleanout	Other	My agency does not recommend that maintenance be performed on sediment basins.
14	6	5	3	0	0
100%	43%	36%	21%	0%	0%

QUESTION 49: *Has your agency recognized a need to perform maintenance on the basin floor after sediment removal?*

Total Responses	YES	NO
33	5	28
100%	15%	85%

QUESTION 50: *What does your agency recommend be done with the sediment removed from the sediment basin?*

(AL) Dry out and use in back-slopes.
(AR) Normally incorporated into embankment construction.
(CO) Replace saturated embankment if basin was located under future embankment or roadway template.
(CT) Use as clean fill in gore areas seed and mulch.
(DE) Depends more on what is happening with the job at the time. Could be stockpiled, dried out, and used somewhere else on the job as fill
If the job does not need any fill material, than the contractor would have to haul away.
(FL) Depends on composition of sediment; used elsewhere if suitable.
(GA) Either haul off the site or incorporate it into embankment construction (after suitable drying has occurred) and stabilize the area.
(IA) Specs require contractor to dispose of silt material off the project unless Engineer approves a suitable site within project limits.
(ID) Put at approved waste sites.
(KS) Contractor is just required to remove and properly dispose of it.
(MD) It shall be placed in such a manner that it will not erode from the site. It shall not be deposited downstream, adjacent to a stream or floodplain. Disposal areas must be stabilized.
(MI) Disposed of at an upland site.
(MN) Place it on the slopes and provide temporary mulch.
(MO) Incorporate it into the fill.
(MS) Either remove from project site or spread out on slopes.
(NC) Material is removed to a location where it will be used in the project or wasted in waste area.
(NE) Incorporate it into the adjacent slopes.
(NH) Placed within the project limits as embankment, if possible.
(NY) Use as fill in upland area (as long as its suitable material).
(OH) Upland land disposal.
(OK) Typically, dried and spread on the project's slopes.
(OR) Dispose on-site. Contractor responsibility.
(PA) Distribute on site and seed.
(RI) Sediment removed is typically sent to a landfill as an alternate cover or disposed as solid waste.
(SC) Place on project slopes.
(SD) Placed back on-site, away from water bodies.
(TN) Taken to an approved waste site.
(TX) Depends on sediment. If contains hazardous waste then it will have to be taken to an approved landfill. If non-hazardous then it can be stockpiled for future fill or embankment needs.
(UT) Disposed of at approved location.
(VA) Dispose of in an agency approved upland site.
(WA) Contractor has to dispose of the sediment on a contractor owned or operated, permitted site. Clean sediments can be stabilized on site using approved BMP's.
(WI) Often wasted on the project outside of the slope intercept or taken offsite to a waste site.

IV. INSPECTION AND MONITORING

QUESTION 51: *What type of monitoring (i.e., data collection), if any, does your agency perform on sediment basins? (select all that apply)*

Total Responses	Sediment volume	Sediment depth	Inflow stormwater volume	Inflow stormwater turbidity (NTU)	Effluent Volume	Effluent Turbidity	Rainfall Amount (in)	Rainfall Intensity (in/hr)	My agency does not monitor sediment basin data
33	7	12	0	2	0	2	8	0	16
100%	21%	36%	0%	6%	0%	6%	24%	0%	48%

QUESTION 52: *What has your agency observed as the average effluent discharge turbidity in sediment basins without skimmers?*

Total Responses	0 - 100 NTU	100 - 250 NTU	250 - 500 NTU	500 - 1000 NTU	Other
1	0	0	0	0	1
100%	0%	0%	0%	0%	100%

Other (Please Specify):

(NC) 1000+

QUESTION 53: *What has your agency observed as the average effluent discharge turbidity in sediment basins with skimmers?*

Total Responses	0 - 100 NTU	100 - 250 NTU	250 - 500 NTU	500 - 1000 NTU	Other
1	0	1	0	0	0
100%	0%	100%	0%	0%	0%

QUESTION 54: *What has your agency observed the average turbidity reduction of sediment basins with skimmers to be?*

Total Responses	No reduction	1 - 100 NTU	100 - 200 NTU	200 - 300 NTU	300 - 400 NTU	400 - 500 NTU	> 500 NTU
2	0	1	0	0	0	1	0
100%	0%	50%	0%	0%	0%	50%	0%

QUESTION 55: *Please provide a link to your agency's specification for sediment basins (if available):*

http://www.iowadot.gov/erl/current/GS/content/2602.pdf
ftp://ftp.dot.state.pa.us/public/bureaus/design/pub408/Pub%20408%202011%20IE/872.pdf
http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/soil_water/details/
http://www.ct.gov/dot/cwp/view.asp?a=3200&q=260108
http://www.dot.state.fl.us/rddesign/dr/Manualsandhandbooks.shtm (& click E & SC Manual)
http://www.dnrec.state.de.us/DNREC2000/Divisions/Soil/Stormwater/New/Delaware%20ESC%20Handbook_06-05.pdf
http://www.okladot.state.ok.us/c_manuals/specbook/oe_ss_2009.pdf
http://www.dot.ga.gov/doingbusiness/theSource/special_provisions/shelf/sp163.pdf
http://www.dot.state.oh.us/Divisions/ConstructionMgt/Specification%20Files/832_05052009_for_2010.PDF
http://www.itd.idaho.gov/manuals/Downloads/spec%2704%27.htm
https://www.dot.ny.gov/main/business-center/engineering/specifications/english-spec-repository/espec1-12-12english.pdf (refer to Section 209)
http://www.coloradodot.info/business/designsupport/standard-plans/m-s-standards-plans-list-sheet
http://www.arkansashighways.com/standard_spec/2003/03-600.pdf (Section 621)
http://www.dot.state.mn.us/environment/erosion/specs.html (Specification 2573)
http://www.modot.mo.gov/business/standards_and_specs/Sec0806.pdf
At this link please refer to Std Spec 01571: http://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:1925,
Guidelines are available at: http://www.sddot.com/pe/roaddesign/docs/WQEP_DesignManual/section6.pdf
Highway Runoff Manual –
http://www.wsdot.wa.gov/publications/manuals/fulltext/M31-16/HighwayRunoff.pdf
and Standard Specifications –
http://www.wsdot.wa.gov/Publications/Manuals/M41-10.htm
http://www.sha.maryland.gov/ , www.mde.state.md.us
http://www.tdot.state.tn.us/construction/specbook/2006_Spec200.pdf
http://www.dot.state.al.us/conweb/doc/Specifications/2008_GASP.pdf#page=232
http://des.nh.gov/organization/divisions/water/stormwater/manual.htm
http://www.ksdot.org/burConsMain/specprov/2007/pdf/07-09002-r05.pdf

V. LESSONS LEARNED

QUESTION 56: *Based upon your agency's experiences, what specific problems has your agency encountered with using sediment basins on construction projects?*

Responding Agency	Comments
ALDOT	Effluent turbidity.
CDOT	Subgrade failure, breach of side berm and outlet control erosion.
ConnDOT	Time to build, cost to clean out long term maintenance.
DelDOT	Making sure the contractor keeps up with the maintenance aspects.
GADOT	The regulator believes they should produce drinking water... Fitting them to a site can be challenging and creativity to preserve a 2:1 flow path length is sometimes needed.
IDOT (IA)	Not enough design is done so that basins are installed at most effective locations. Sediment basins are sometimes installed much smaller than shown on Standard Road Plan. Basins filling up very quickly when contractor is not keeping up with site stabilization. On a side note, we are planning to revise our Design Manual and Standard Road Plans to include basins with riser pipes.
IDOT (ID)	Poor design and slope failure.
KDOT	Getting the contractor to properly build and maintain them. Having state agencies provide the design of sediment basins to the contractor and having state required maintenance program for sediment basins would improve the quality and effectiveness of sediment basins. I just want to clarify that we are talking about temporary sediment basins. If we are talking permanent basins there really is no problem. They build them as we put in the plans and we maintain them after the project is done. The problem I see is when we don't design specifically to put the into our plans but rather just provide the r/w room for them and leave the design and implementation time up to the contractor. I think they just don't want to take the time and effort to construct them. As far as the maintenance of them the contractor is already required to maintain them, and if we are talking about maintenance with state forces I think that would actually cause greater issues. Part of our issue is enforcement on the part of our inspectors and engineers in the field.
MDOT (MD)	Right of way agreements and property purchases to have adequate space for the Basins.
MDOT (MI)	Problems with containing clay particles.
MnDOT	Not always used at the proper time and constraints with right of way also not always maintained.
MODOT	Limited right of way and fat clay soils that take a long time to clear.
MDOT (MS)	Right-of-way limitations may not allow the proper sizing of the required silt basin.
NCDOT	Basins along with coir fiber baffles, Skimmers, proper stabilization, and flocculants can provide a very affective device at reducing the sediment and turbidity of project effluent. Problems occur when topography prevents proper size and placement of the basins. Poor installation and maintenance results in basin failures.
NDOT	Contractors opening them to drain faster.
NHDOT	Controlling effluent turbidity.
NYSDOT	1- Sediment particles too fine to settle out (i.e. sediment basin was probably an inappropriate practice for the situation). 2- Contractors put too much faith in the basins to work properly, and become less diligent in the use of erosion and sediment control elsewhere in the drainage area.
ODOT (OH)	Limited R/W, MOT Hazards, Slope Stability.
ODOT (OK)	Oklahoma has not evolved in the efficient design and use of sediment basins. The challenges involved in the timely design of these features that would enable the necessary R/W
ODOT (OR)	Only used on a few large projects. Have not experienced any significant problems.
PennDOT	Performance in areas with clayey soils.
RIDOT	Maintenance during construction and monitoring during construction are typical issues.
SCDOT	Some were not sized properly and some were not maintained according to plans.
SDDOT	Finding adequate land area to construct & maintain.
TDOT	Lack of right-of -way.
WisDOT	Most of the time they are not designed into projects as not to limit a contractor's means and methods. We have many difficulties with improper design and timing of installation. We are looking to develop a new spec closely modeled after the one used by the other state agencies: (http://dnr.wi.gov/runoff/pdf/stormwater/techstds/erosion/SedimentBasin_1064.pdf) The difficult part is determining when they are DOT designed vs. contractor designed.

QUESTION 57: *Based upon your agency's experiences, what changes would you suggest to improve the efficiency and use of sediment basins on construction projects?*

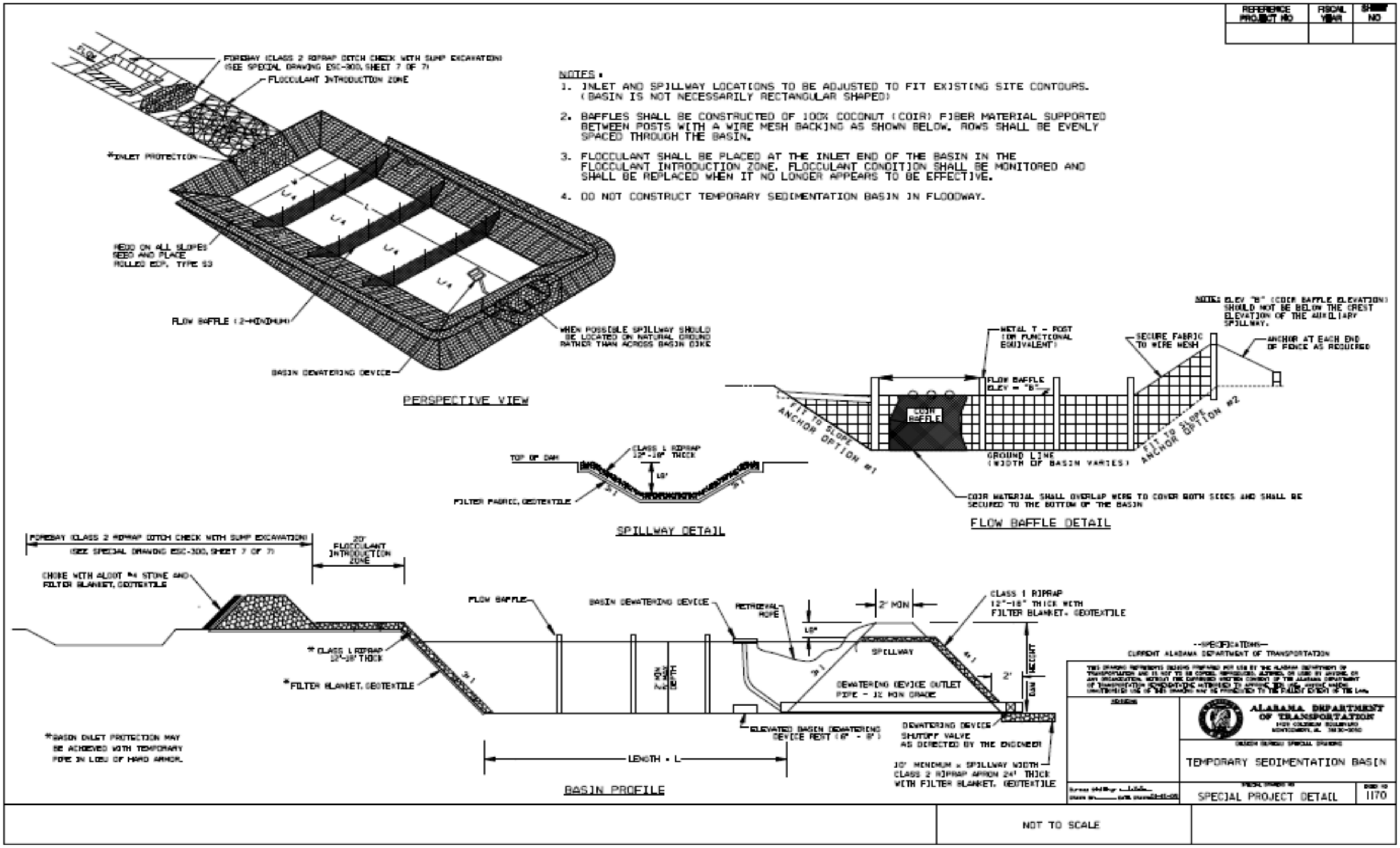
Responding Agency	Comments
CDOT	Require max inflow design slope and increase capacity where possible.
ConnDOT	Design up front with PE Plans.
DelDOT	I would try and limit the use of temporary sediment basins if at all possible. This could be done by more attention to detail of project phasing aspects as well as a lot more temporary stabilization. If having to construct a permanent pond, which we do a lot, than a sediment basin is not that big of deal, but if doing a sediment basin that will be removed, I believe that is possibly more additional construction than is necessary as well as trying to find space on a road project. Again, if the phasing aspects are worked out with the contractor and use of temporary stabilization is increased, there should not be any reason to just use sediment traps versus basins. But, if the effluent limit guidelines ever get enacted, I believe sediment basins will be a necessity along with using PAM's.
FDOT	More usage of PAM’s.
GADOT	We are moving slowly toward using flocculants and considering skimmers as well. (Having the colloidal clays that we do, as does Alabama, makes the passive control effectiveness a challenge in N Ga.)
IDOT (ID)	Better engineering review process and more frequent maintenance.
KDOT	Require them more often.
MDOT (MI)	Timely stabilization of ditch slopes and bottoms.
MnDOT	Timely incorporation and effective locations, possibly more time to obtain temporary easements for basins.
MODOT	Increase the size where possible and keep the basin well maintained.
NCDOT	Mandate how the project will be graded and require contractor to provide a plan to open and close out areas so that basins can be utilized in the best way.
NDOT	Strengthen permit requirements to ensure they are designed and built.
NHDOT	Continued monitoring and performance evaluation could provide valuable information with respect to improvements.
NYSDOT	Increase the size of the basins per drainage area. Allow increased settlement times.
ODOT (OH)	Good Question!
ODOT (OK)	Emphasis during the early design stages.
PennDOT	Non-proprietary "floating" or "skimming" device that can be easily fabricated by contractors. PennDOT cannot use the Faircloth Skimmer because it is proprietary and FHWA rules do not allow specification of items when alternate methods (such as a riser pipe) are available.
RIDOT	Ensure sufficient right of way is obtained for installation of the basin.
SDDOT	Developing standard details & notes. Instill as a cultural norm.
TDOT	Phasing of project to reduce basin size.
WaDOT	Possibly using skimmers for outlets. We are looking into that, but since our outfall sizing is based on predevelopment flows and we have to use a continuous storm simulation model (in Western Washington), we have not determined a way to size them yet.
WisDOT	Clearer understanding of appropriate design and functioning.

QUESTION 58: *Based upon your agency's experiences, what positive practices or designs would you recommend on the use of sediment basins?*

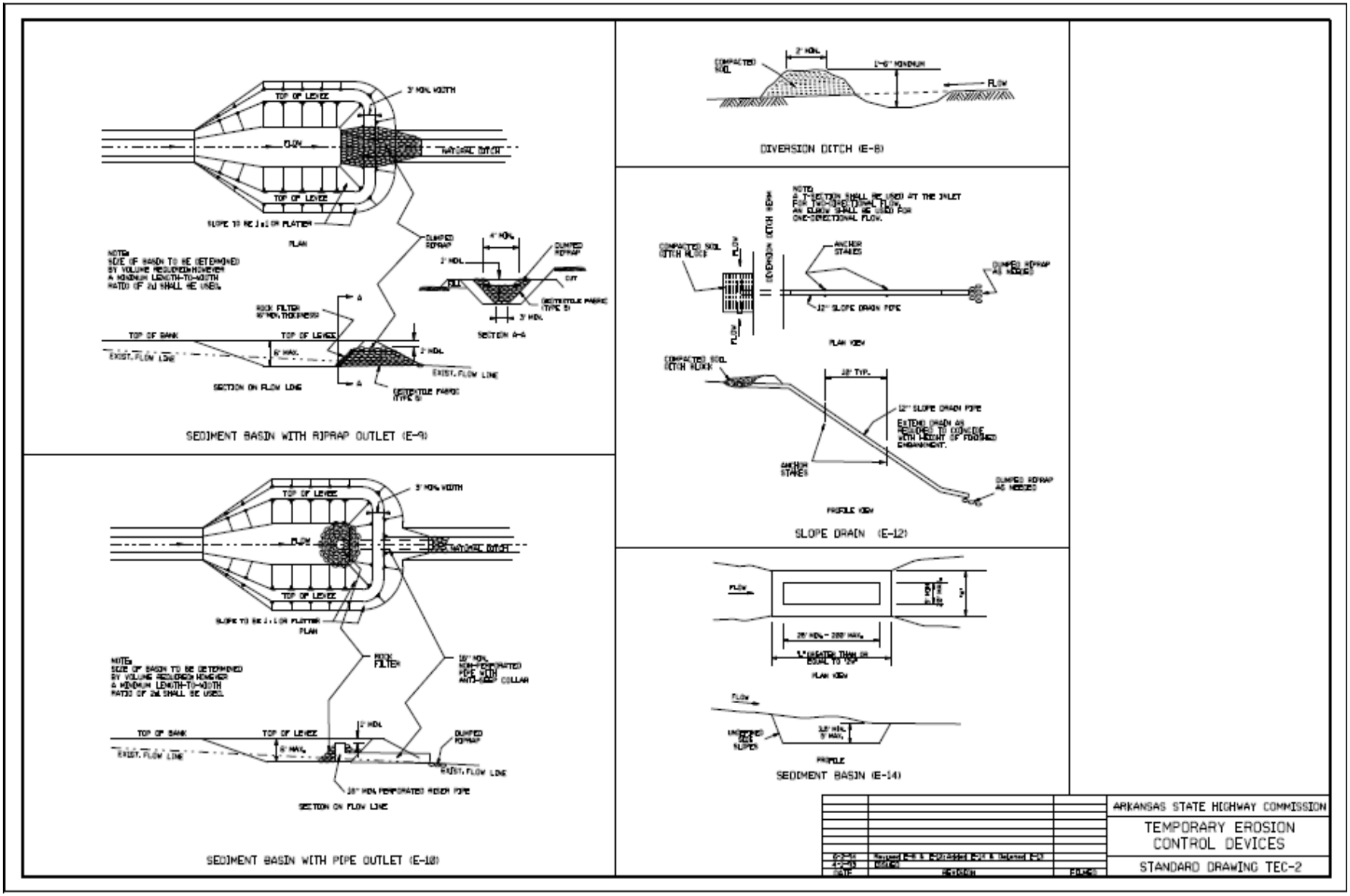
Responding Agency	Comments
ConnDOT	Ensure that the basin is stable before you allow drainage to enter.
CDOT	Require geotextile under riprap weir and maintain min length to width ratio of 4:1.
FDOT	More usage of PAM's.
GADOT	Have a maintenance requirement, try to avoid constructing one from embankment; instead excavate them from existing topography when you can. Stabilize the interior.
IDOT (IA)	Riser pipes, possibly flocculants.
IDOT (ID)	Useful in meeting effluent requirements.
MDOT (MD)	Rip-Rap Outfall structures, Weir Walls with Draw down devices, daily inspections by project staff, Bi-weekly QA Inspections by Environmental Compliance representatives, Proper maintenance and clean out.
MDOT (MI)	Keep them maintained and install correctly.
MnDOT	Work in progress.
MODOT	Get the basin installed as early in the project as clearing and grubbing will allow.
NYSDOT	There is more to erosion control then the use of sediment basins. Reliance can not be on basins alone if you want to be successful. It will require every tool in a BMP tool box to reach the goal of the effluent limitation guidelines set by the EPA.
NCDOT	With the linear nature of our projects, the treatment train approach seems affective.
ODOT (OR)	Combine sediment basin use with other erosion control methods (e.g. flocculants) in highly erodible soils.
RIDOT	Require that side slopes be stable before allowing the basin to be used.
ODOT (OH)	If appropriate sediment basin footprint areas are identified in the plans, the Contractor designed sediment basins become practical.
ODOT (OK)	Would like to know what other states are doing in this area.
PennDOT	Consider disturbed soils within the contributing drainage area carefully.
RIDOT	Site specific design criteria should be carefully considered.
SCDOT	Design with the intent to convert to permanent detention/water quality after completion of project.
SDDOT	Use sediment traps where ever feasible. Maintenance is essential. Use a maximum of 3:1 side slopes. Consider safety of traveling public. Proper placement. Fit the practice to the actual site be flexible. Use other BMPs where basins are not practical.
TDOT (TN)	The use of skimmers. Adequately sized basins.
WaDOT	Use a sediment trap upstream of the basin. Use multiple sediment control BMPs while conveying the water to the facility such as grass lined ditches with check dams.
WisDOT	Longer retention times. Acknowledgement of different soil types, this will affect the size and performance of the basin. Require baffles when using polymers.

APPENDIX B: STANDARD DESIGN DRAWINGS BY STATE

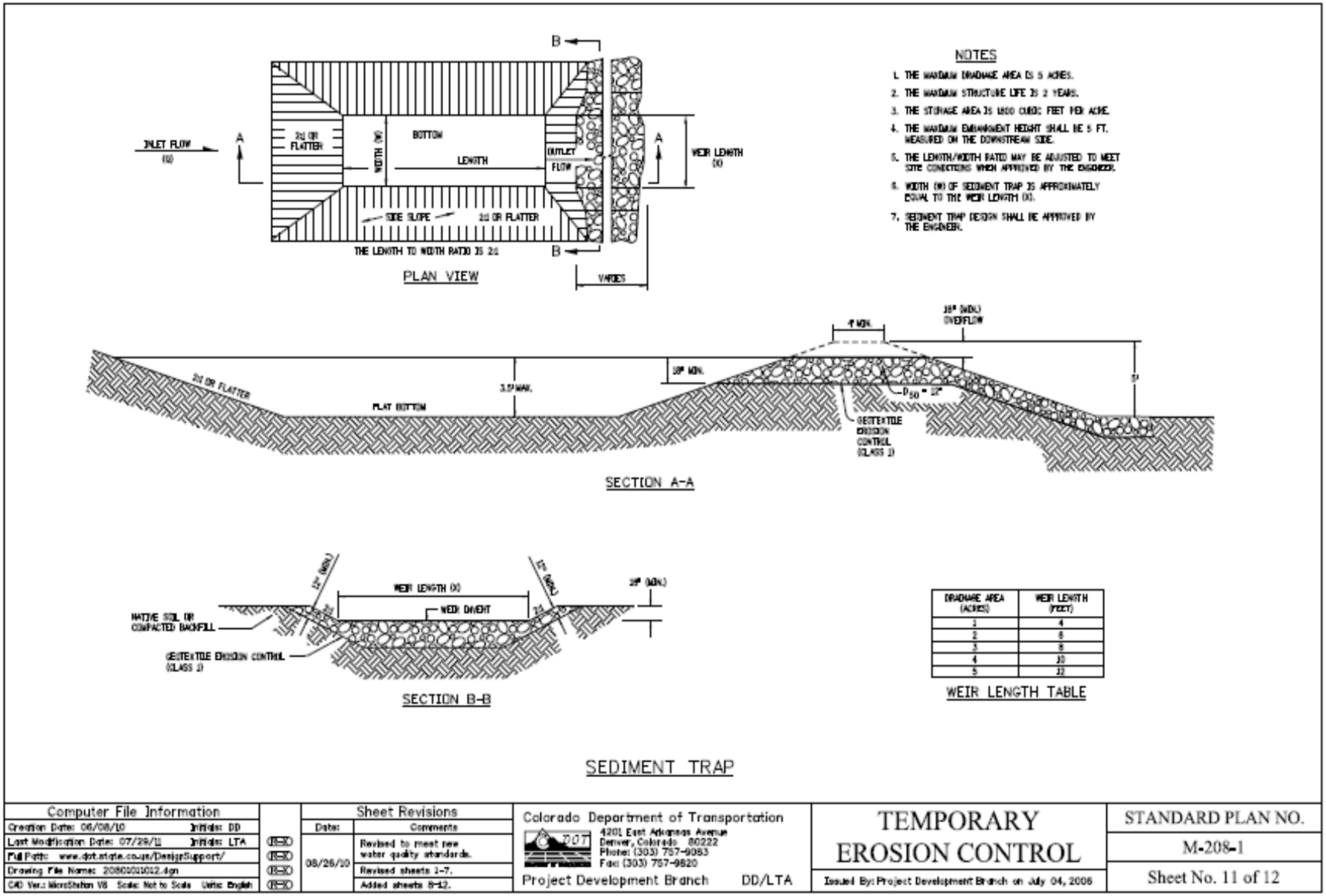
Alabama:



Arkansas:


DIVERSION DITCH (E-8)
SLOPE DRAIN (E-12)
SEDIMENT BASIN WITH RIPRAP OUTLET (E-9)
SEDIMENT BASIN WITH PIPE OUTLET (E-10)
SEDIMENT BASIN (E-14)
ARKANSAS STATE HIGHWAY COMMISSION
TEMPORARY EROSION
CONTROL DEVICES
STANDARD DRAWING TEC-2

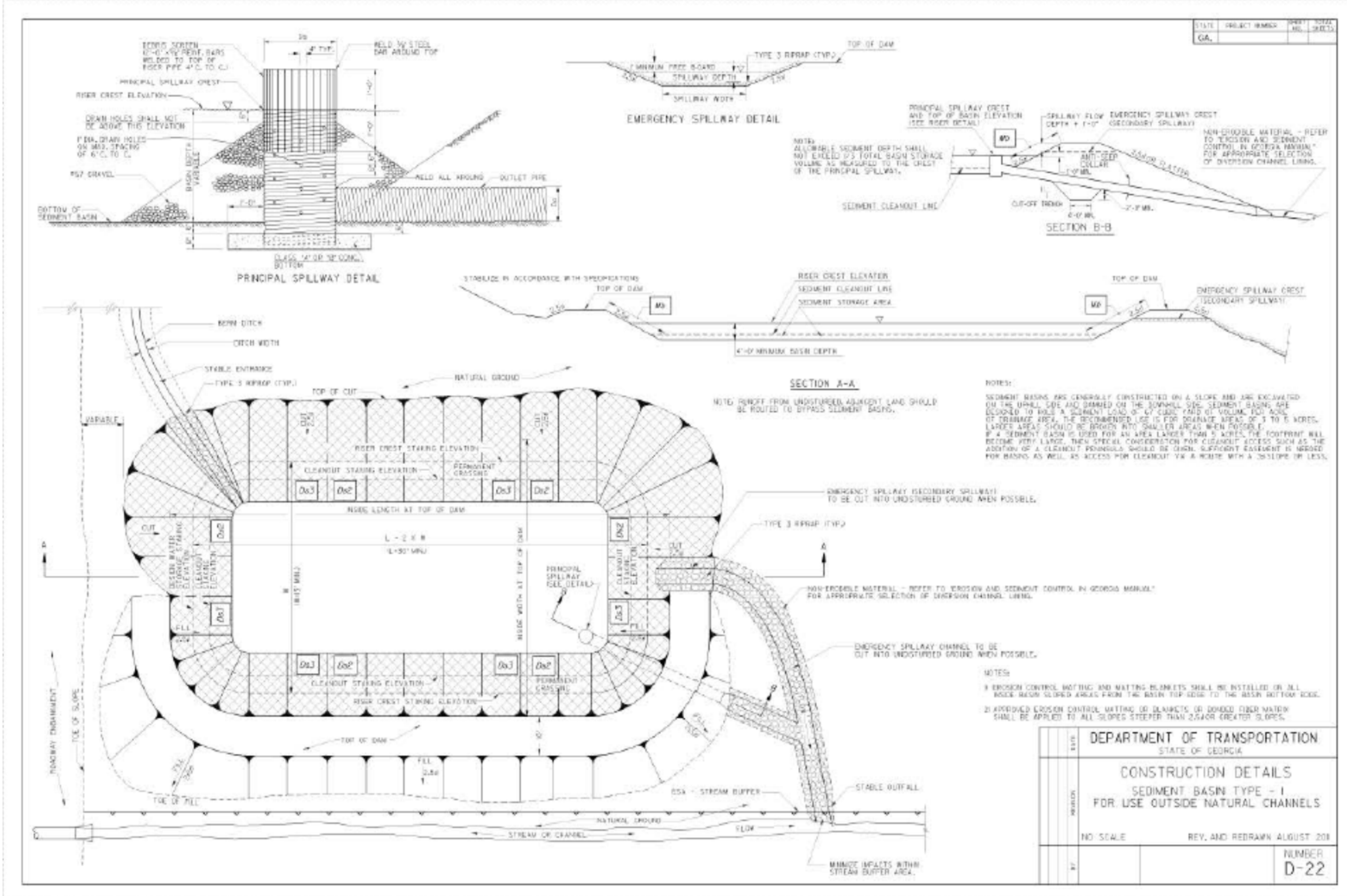
Colorado:



DRAINAGE AREA (ACRES)	WEIR LENGTH (FEET)
1	4
2	6
3	8
4	10
5	12

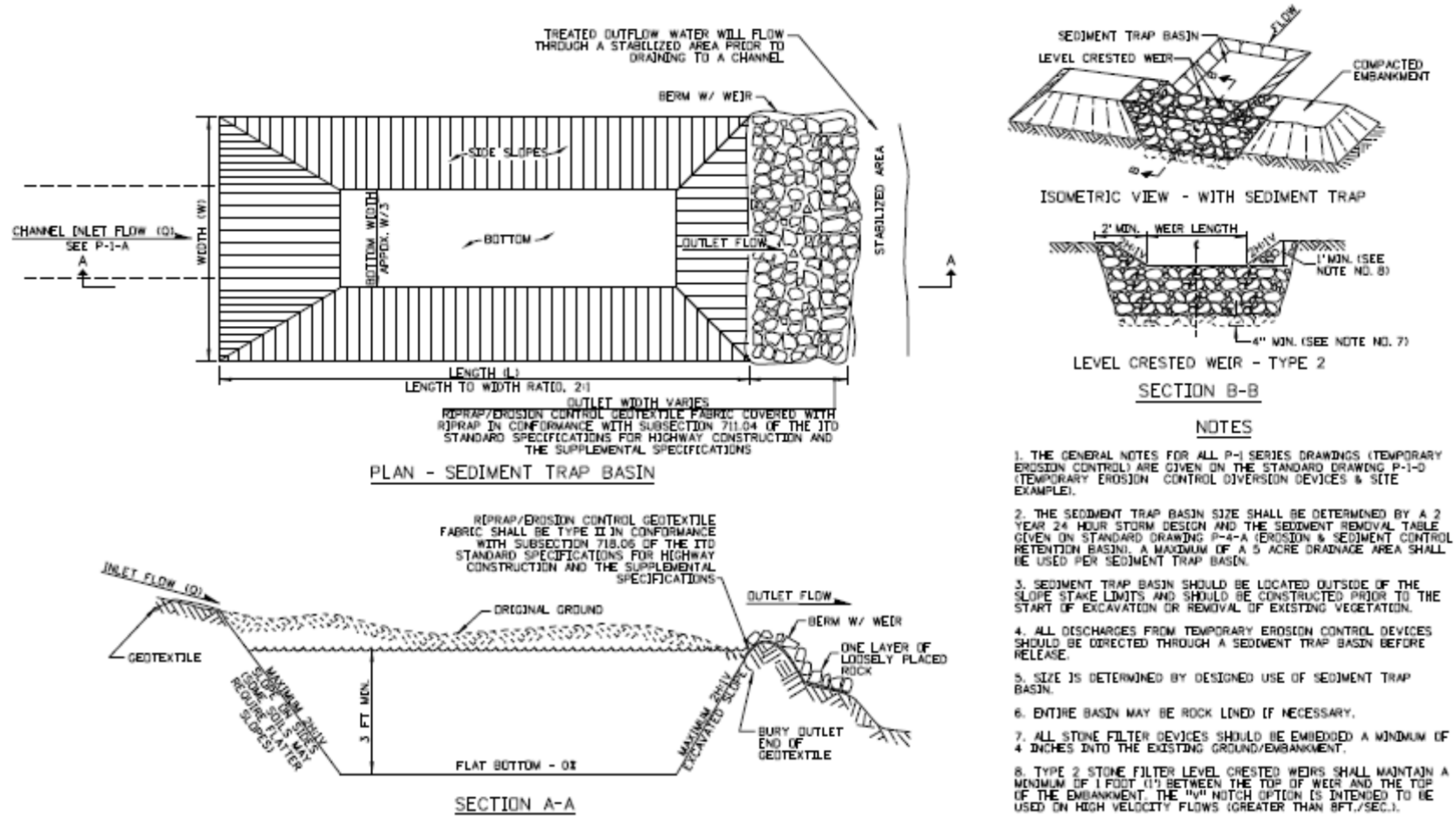
WEIR LENGTH TABLE

Georgia:



PRINCIPAL SPILLWAY DETAIL
EMERGENCY SPILLWAY DETAIL
SECTION B-B
SECTION A-A
NOTE: RUNOFF FROM UNDISTURBED ADJACENT LAND SHOULD BE ROUTED TO BYPASS SEDIMENT BASINS.
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
CONSTRUCTION DETAILS
SEDIMENT BASIN TYPE - I
FOR USE OUTSIDE NATURAL CHANNELS
NO SCALE
NUMBER
D-22

Idaho:



NOTES

1. THE GENERAL NOTES FOR ALL P-1 SERIES DRAWINGS (TEMPORARY EROSION CONTROL) ARE GIVEN ON THE STANDARD DRAWING P-1-D (TEMPORARY EROSION CONTROL DIVERSION DEVICES & SITE EXAMPLE).
2. THE SEDIMENT TRAP BASIN SIZE SHALL BE DETERMINED BY A 2 YEAR 24 HOUR STORM DESIGN AND THE SEDIMENT REMOVAL TABLE GIVEN ON STANDARD DRAWING P-4-A (EROSION & SEDIMENT CONTROL RETENTION BASIN). A MAXIMUM OF A 5 ACRE DRAINAGE AREA SHALL BE USED PER SEDIMENT TRAP BASIN.
3. SEDIMENT TRAP BASIN SHOULD BE LOCATED OUTSIDE OF THE SLOPE STAKE LIMITS AND SHOULD BE CONSTRUCTED PRIOR TO THE START OF EXCAVATION OR REMOVAL OF EXISTING VEGETATION.
4. ALL DISCHARGES FROM TEMPORARY EROSION CONTROL DEVICES SHOULD BE DIRECTED THROUGH A SEDIMENT TRAP BASIN BEFORE RELEASE.
5. SIZE IS DETERMINED BY DESIGNED USE OF SEDIMENT TRAP BASIN.
6. ENTIRE BASIN MAY BE ROCK LINED IF NECESSARY.
7. ALL STONE FILTER DEVICES SHOULD BE EMBEDDED A MINIMUM OF 4 INCHES INTO THE EXISTING GROUND/EMBANKMENT.
8. TYPE 2 STONE FILTER LEVEL CRESTED WEIRS SHALL MAINTAIN A MINIMUM OF 1 FOOT (1') BETWEEN THE TOP OF WEIR AND THE TOP OF THE EMBANKMENT. THE "V" NOTCH OPTION IS INTENDED TO BE USED ON HIGH VELOCITY FLOWS (GREATER THAN 8FT./SEC.).
9. NOT TO SCALE.

ORIGINAL STORED AT: ITD, Headquarters 3311 West State Boise, Idaho

ORIGINAL SIGNED BY: KARISSA HARDY DATE ORIGINAL SIGNED: OCTOBER 26, 2011

REVISIONS								
NO.	DATE	BY	NO.	DATE	BY	NO.	DATE	BY
①	9-93	MSM						
②	2-96	MSM						
③	10-2010	KEH						
④	10-2011	KEH						

SCALES SHOWN ARE FOR 11" X 17" PRINTS ONLY

CADD FILE NAME: p1c_1011.std

DRAWING DATE: APRIL, 1993

IDAHO TRANSPORTATION DEPARTMENT

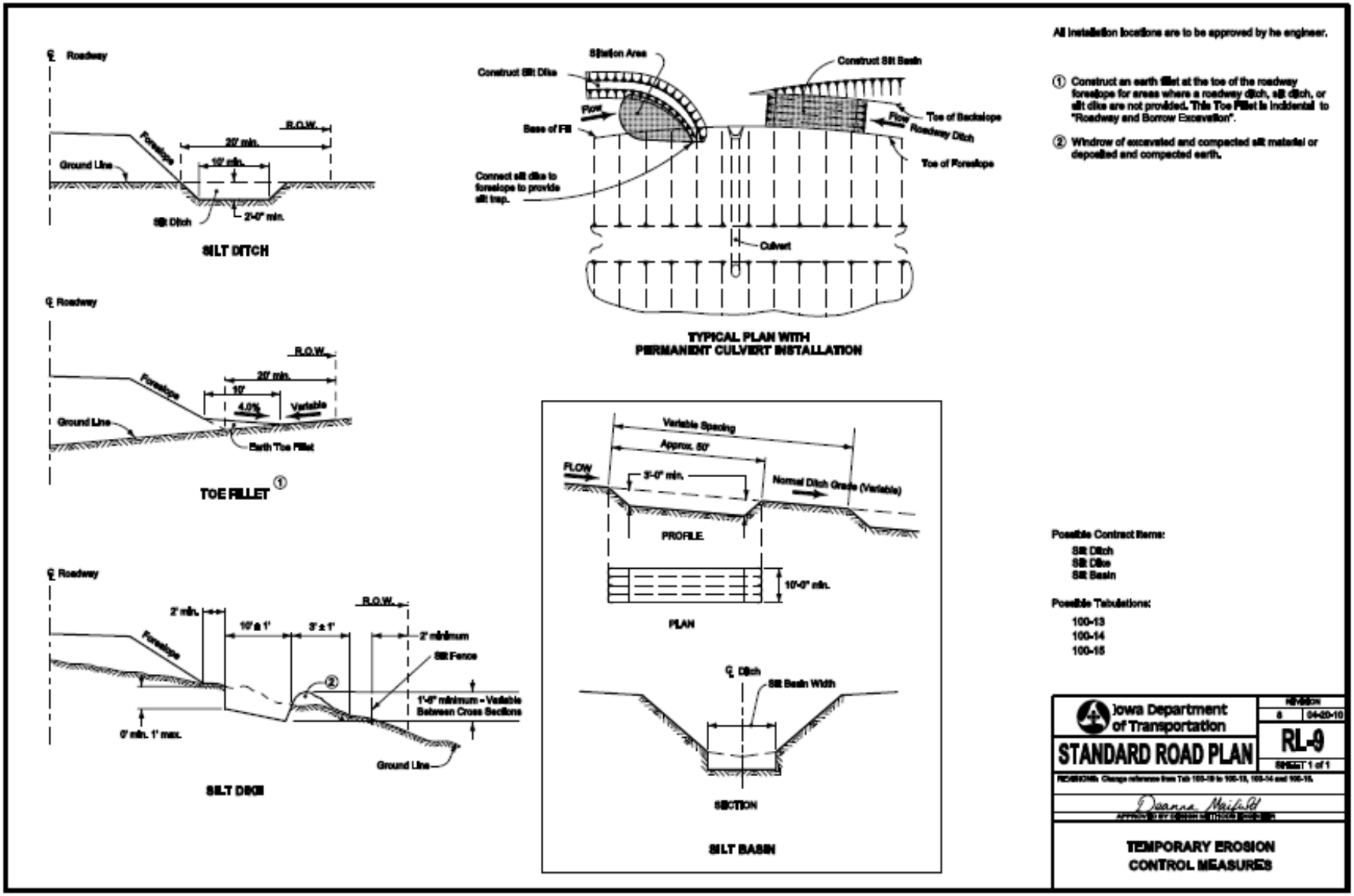
BOISE IDAHO

ORIGINAL SIGN BY: LOREN THOMAS
HIGHWAYS PROGRAM OVERSIGHT ENGINEER
ORIGINAL SIGN BY: TOM COLE
CHIEF ENGINEER

STANDARD DRAWING
EROSION & SEDIMENT CONTROL SEDIMENT TRAP BASIN
REQUIRES STD. DWG. P-1-D & P-4-A

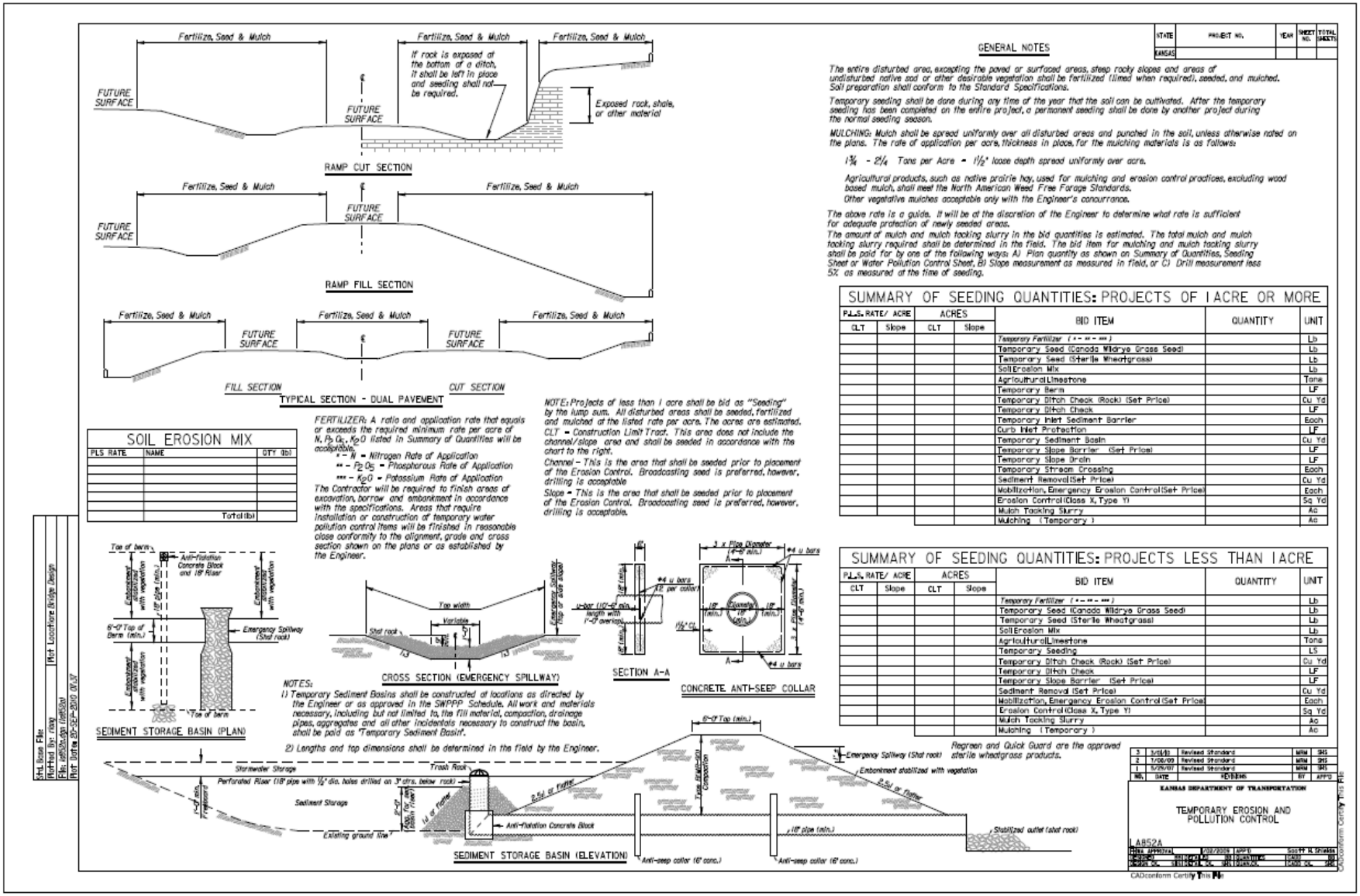
English
STANDARD DRAWING NO.
P-1-C
SHEET 1 OF 1

Iowa:

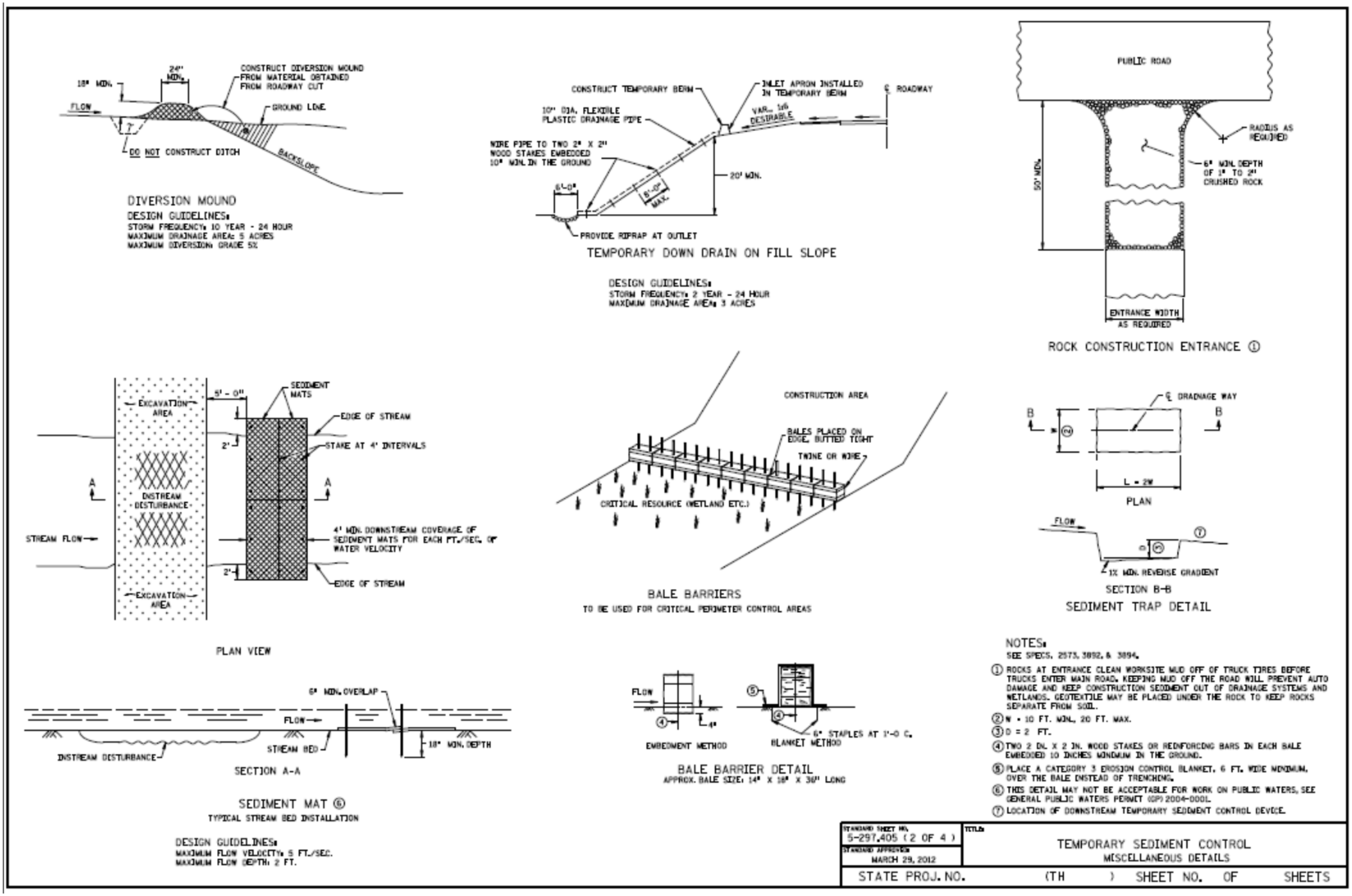


All installation locations are to be approved by he engineer.
① Construct an earth fillet at the toe of the roadway foreslope for areas where a roadway ditch, silt ditch, or silt dike are not provided. This Toe Fillet is incidental to "Roadway and Borrow Excavation".
② Windrow of excavated and compacted silt material or deposited and compacted earth.
SILT DITCH
TOE FILLET ①
SILT DIKE
TYPICAL PLAN WITH PERMANENT CULVERT INSTALLATION
PROFILE
PLAN
SECTION
SILT BASIN
Possible Contract Items:
Silt Ditch
Silt Dike
Silt Basin
Possible Tabulations:
100-13
100-14
100-15
Iowa Department of Transportation
STANDARD ROAD PLAN
RL-9
TEMPORARY EROSION CONTROL MEASURES

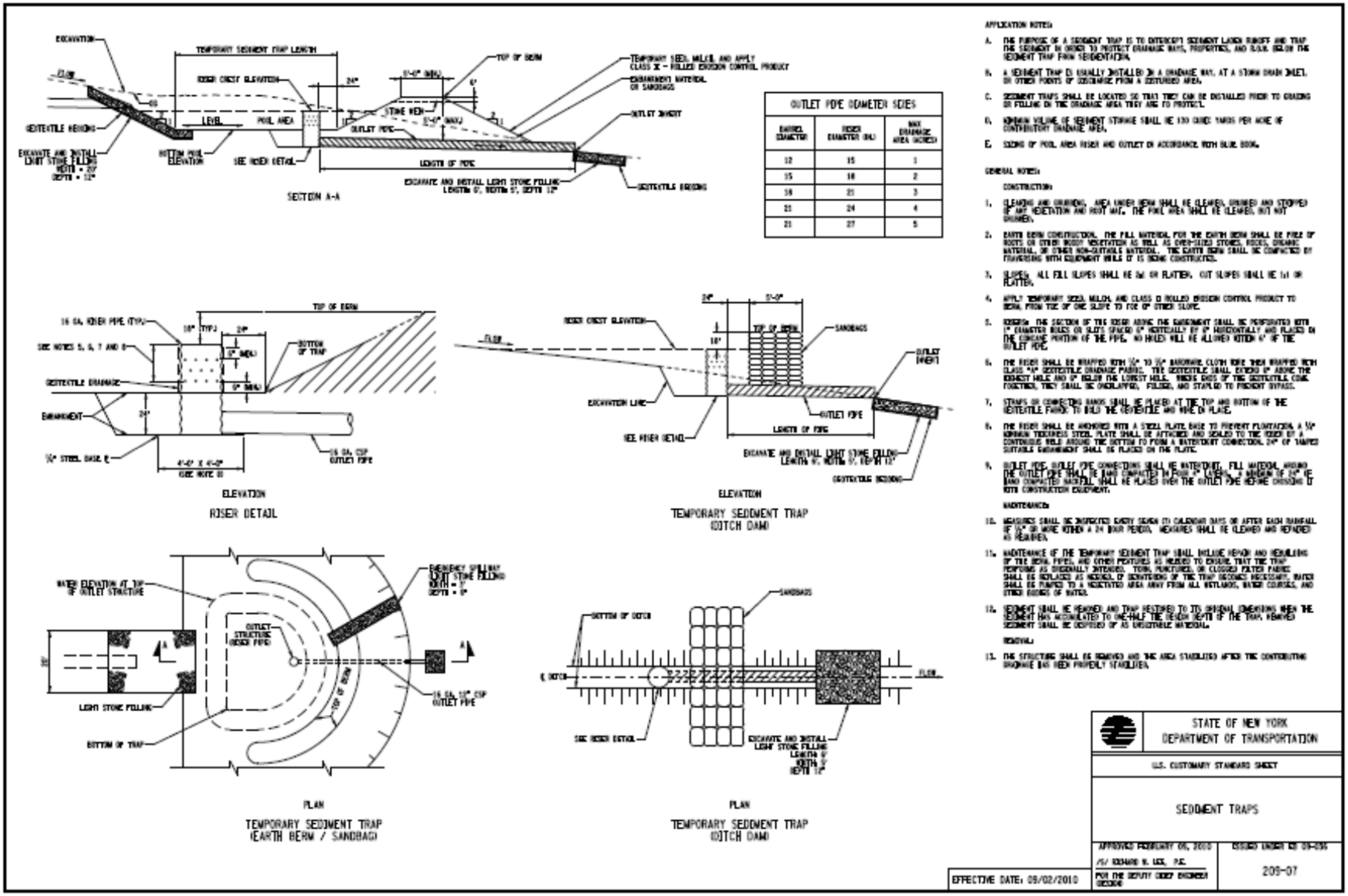
Kansas:


GENERAL NOTES
The entire disturbed area, excepting the paved or surfaced areas, steep rocky slopes and areas of undisturbed native sod or other desirable vegetation shall be fertilized (limed when required), seeded, and mulched. Soil preparation shall conform to the Standard Specifications.
Temporary seeding shall be done during any time of the year that the soil can be cultivated. After the temporary seeding has been completed on the entire project, a permanent seeding shall be done by another project during the normal seeding season.
MULCHING: Mulch shall be spread uniformly over all disturbed areas and punched in the soil, unless otherwise noted on the plans. The rate of application per acre, thickness in place, for the mulching materials is as follows:
1¾ - 2¼ Tons per Acre = 1½" loose depth spread uniformly over acre.
Agricultural products, such as native prairie hay, used for mulching and erosion control practices, excluding wood based mulch, shall meet the North American Weed Free Forage Standards.
Other vegetative mulches acceptable only with the Engineer's concurrence.
The above rate is a guide. It will be at the discretion of the Engineer to determine what rate is sufficient for adequate protection of newly seeded areas.
The amount of mulch and mulch tacking slurry in the bid quantities is estimated. The total mulch and mulch tacking slurry required shall be determined in the field. The bid item for mulching and mulch tacking slurry shall be paid for by one of the following ways: A) Plan quantity as shown on Summary of Quantities, Seeding Sheet or Water Pollution Control Sheet, B) Slope measurement as measured in field, or C) Drill measurement less 5% as measured at the time of seeding.
SUMMARY OF SEEDING QUANTITIES: PROJECTS OF 1 ACRE OR MORE
P.L.S. RATE/ ACRE
ACRES
CLT
Slope
BID ITEM
QUANTITY
UNIT
Temporary Fertilizer (* - ** - ***) Lb
Temporary Seed (Canada Wildrye Grass Seed) Lb
Temporary Seed (Sterile Wheatgrass) Lb
Soil Erosion Mix Lb
Agricultural Limestone Tons
Temporary Berm LF
Temporary Ditch Check (Rock) (Set Price) Cu Yd
Temporary Ditch Check LF
Temporary Inlet Sediment Barrier Each
Curb Inlet Protection LF
Temporary Sediment Basin Cu Yd
Temporary Slope Barrier (Set Price) LF
Temporary Slope Drain LF
Temporary Stream Crossing Each
Sediment Removal (Set Price) Cu Yd
Mobilization, Emergency Erosion Control (Set Price) Each
Erosion Control (Class X, Type Y) Sq Yd
Mulch Tacking Slurry Ac
Mulching (Temporary) Ac
SUMMARY OF SEEDING QUANTITIES: PROJECTS LESS THAN 1 ACRE
Temporary Fertilizer (* - ** - ***) Lb
Temporary Seed (Canada Wildrye Grass Seed) Lb
Temporary Seed (Sterile Wheatgrass) Lb
Soil Erosion Mix Lb
Agricultural Limestone Tons
Temporary Seeding LS
Temporary Ditch Check (Rock) (Set Price) Cu Yd
Temporary Ditch Check LF
Temporary Slope Barrier (Set Price) LF
Sediment Removal (Set Price) Cu Yd
Mobilization, Emergency Erosion Control (Set Price) Each
Erosion Control (Class X, Type Y) Sq Yd
Mulch Tacking Slurry Ac
Mulching (Temporary) Ac
Regreen and Quick Guard are the approved sterile wheatgrass products.
Fertilize, Seed & Mulch
FUTURE SURFACE
If rock is exposed at the bottom of a ditch, it shall be left in place and seeding shall not be required.
Exposed rock, shale, or other material
RAMP CUT SECTION
RAMP FILL SECTION
FILL SECTION
CUT SECTION
TYPICAL SECTION - DUAL PAVEMENT
SOIL EROSION MIX
PLS RATE
NAME
QTY (lb)
Total (lb)
FERTILIZER: A ratio and application rate that equals or exceeds the required minimum rate per acre of N, P₂O₅, K₂O listed in Summary of Quantities will be acceptable.
* - N = Nitrogen Rate of Application
** - P₂O₅ = Phosphorous Rate of Application
*** - K₂O = Potassium Rate of Application
The Contractor will be required to finish areas of excavation, borrow and embankment in accordance with the specifications. Areas that require installation or construction of temporary water pollution control items will be finished in reasonable close conformity to the alignment, grade and cross section shown on the plans or as established by the Engineer.
NOTE: Projects of less than 1 acre shall be bid as "Seeding" by the lump sum. All disturbed areas shall be seeded, fertilized and mulched at the listed rate per acre. The acres are estimated.
CLT = Construction Limit Tract. This area does not include the channel/slope area and shall be seeded in accordance with the chart to the right.
Channel - This is the area that shall be seeded prior to placement of the Erosion Control. Broadcasting seed is preferred, however, drilling is acceptable.
Slope - This is the area that shall be seeded prior to placement of the Erosion Control. Broadcasting seed is preferred, however, drilling is acceptable.
SEDIMENT STORAGE BASIN (PLAN)
CROSS SECTION (EMERGENCY SPILLWAY)
SECTION A-A
CONCRETE ANTI-SEEP COLLAR
NOTES:
1) Temporary Sediment Basins shall be constructed at locations as directed by the Engineer or as approved in the SWPPP Schedule. All work and materials necessary, including but not limited to, the fill material, compaction, drainage pipes, aggregates and all other incidentals necessary to construct the basin, shall be paid as "Temporary Sediment Basin".
2) Lengths and top dimensions shall be determined in the field by the Engineer.
SEDIMENT STORAGE BASIN (ELEVATION)
KANSAS DEPARTMENT OF TRANSPORTATION
TEMPORARY EROSION AND POLLUTION CONTROL
LA852A

Minnesota:


18" MIN.
24" MIN.
CONSTRUCT DIVERSION MOUND FROM MATERIAL OBTAINED FROM ROADWAY CUT
FLOW
GROUND LINE
DO NOT CONSTRUCT DITCH
BACKSLOPE
DIVERSION MOUND
DESIGN GUIDELINES:
STORM FREQUENCY: 10 YEAR - 24 HOUR
MAXIMUM DRAINAGE AREA: 5 ACRES
MAXIMUM DIVERSION: GRADE 5%
CONSTRUCT TEMPORARY BERM
INLET APRON INSTALLED IN TEMPORARY BERM
℄ ROADWAY
10" DIA. FLEXIBLE PLASTIC DRAINAGE PIPE
VAR.- 1/6 DESIRABLE
WIRE PIPE TO TWO 2" X 2" WOOD STAKES EMBEDDED 10" MIN. IN THE GROUND
20' MIN.
6'-0"
8'-0" MAX.
PROVIDE RIPRAP AT OUTLET
TEMPORARY DOWN DRAIN ON FILL SLOPE
DESIGN GUIDELINES:
STORM FREQUENCY: 2 YEAR - 24 HOUR
MAXIMUM DRAINAGE AREA: 3 ACRES
PUBLIC ROAD
RADIUS AS REQUIRED
50' MIN.
6" MIN. DEPTH OF 1" TO 2" CRUSHED ROCK
ENTRANCE WIDTH AS REQUIRED
ROCK CONSTRUCTION ENTRANCE ①
SEDIMENT MATS
5' - 0"
EXCAVATION AREA
EDGE OF STREAM
2'
STAKE AT 4' INTERVALS
A
INSTREAM DISTURBANCE
STREAM FLOW
4' MIN. DOWNSTREAM COVERAGE OF SEDIMENT MATS FOR EACH FT./SEC. OF WATER VELOCITY
EDGE OF STREAM
EXCAVATION AREA
PLAN VIEW
CONSTRUCTION AREA
BALES PLACED ON EDGE, BUTTED TIGHT
TWINE OR WIRE
CRITICAL RESOURCE (WETLAND ETC.)
BALE BARRIERS
TO BE USED FOR CRITICAL PERIMETER CONTROL AREAS
℄ DRAINAGE WAY
B
②
L = 2W
PLAN
FLOW
⑦
③
1% MIN. REVERSE GRADIENT
SECTION B-B
SEDIMENT TRAP DETAIL
6" MIN. OVERLAP
FLOW
STREAM BED
18" MIN. DEPTH
INSTREAM DISTURBANCE
SECTION A-A
SEDIMENT MAT ⑥
TYPICAL STREAM BED INSTALLATION
DESIGN GUIDELINES:
MAXIMUM FLOW VELOCITY: 5 FT./SEC.
MAXIMUM FLOW DEPTH: 2 FT.
FLOW
④
4"
EMBEDMENT METHOD
⑤
6" STAPLES AT 1'-0 C.
BLANKET METHOD
BALE BARRIER DETAIL
APPROX. BALE SIZE: 14" X 18" X 30" LONG
NOTES:
SEE SPECS. 2573, 3892, & 3894.
① ROCKS AT ENTRANCE CLEAN WORKSITE MUD OFF OF TRUCK TIRES BEFORE TRUCKS ENTER MAIN ROAD. KEEPING MUD OFF THE ROAD WILL PREVENT AUTO DAMAGE AND KEEP CONSTRUCTION SEDIMENT OUT OF DRAINAGE SYSTEMS AND WETLANDS. GEOTEXTILE MAY BE PLACED UNDER THE ROCK TO KEEP ROCKS SEPARATE FROM SOIL.
② W = 10 FT. MIN., 20 FT. MAX.
③ D = 2 FT.
④ TWO 2 IN. X 2 IN. WOOD STAKES OR REINFORCING BARS IN EACH BALE EMBEDDED 10 INCHES MINIMUM IN THE GROUND.
⑤ PLACE A CATEGORY 3 EROSION CONTROL BLANKET, 6 FT. WIDE MINIMUM, OVER THE BALE INSTEAD OF TRENCHING.
⑥ THIS DETAIL MAY NOT BE ACCEPTABLE FOR WORK ON PUBLIC WATERS, SEE GENERAL PUBLIC WATERS PERMIT (GP) 2004-0001.
⑦ LOCATION OF DOWNSTREAM TEMPORARY SEDIMENT CONTROL DEVICE.
STANDARD SHEET NO.
5-297.405 (2 OF 4)
STANDARD APPROVED
MARCH 29, 2012
TITLE:
TEMPORARY SEDIMENT CONTROL
MISCELLANEOUS DETAILS
STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

New York:



SECTION A-A
TEMPORARY SEDIMENT TRAP LENGTH
LENGTH OF PIPE
OUTLET PIPE DIAMETER SIZES
BARREL DIAMETER
RISER DIAMETER (IN.)
MAX DRAINAGE AREA (ACRES)
12 15 1
15 18 2
18 21 3
21 24 4
21 27 5
APPLICATION NOTES:
GENERAL NOTES:
CONSTRUCTION:
MAINTENANCE:
REMOVAL:
ELEVATION
RISER DETAIL
ELEVATION
TEMPORARY SEDIMENT TRAP
(DITCH DAM)
PLAN
TEMPORARY SEDIMENT TRAP
(EARTH BERM / SANDBAG)
PLAN
TEMPORARY SEDIMENT TRAP
(DITCH DAM)
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
U.S. CUSTOMARY STANDARD SHEET
SEDIMENT TRAPS
EFFECTIVE DATE: 09/02/2010
209-07

North Carolina:

PROJECT REFERENCE NO.	SHEET NO.
X-XXXX	EC-X
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

BORROW PIT DEWATERING BASIN DETAIL

GENERAL NOTES:

DETERMINE BORROW PIT DEWATERING BASIN SIZE USING $V = 8.0203 * Q * T$, WHERE V IS VOLUME (FT^3), Q IS PUMP FLOW RATE (GPM), AND T IS DEWATERING TIME (HR). USE MAXIMUM FLOW RATE OF 1000 GPM AND A MINIMUM DEWATERING TIME OF 2 HOURS.

RISER SHALL BE A NON-PERFORATED, SMOOTH OR CORRUGATED MATERIAL WITH A FLASHBOARD OPTION.

CONSTRUCT THE COIR FIBER BAFFLE IN ACCORDANCE WITH ROADWAY STANDARD DRAWING 1640.01 AND WITH MATERIAL THAT MEETS THE SPECIFICATIONS OF ROADWAY STANDARD 1060-14.

PROVIDE 5′ STEEL POSTS OF THE SELF-FASTENER ANGLE STEEL TYPE. INSTALL STEEL POSTS WITH NO MORE THAN 3′ OF THE POST APPEARING ABOVE THE GROUND.

ATTACH THE COIR FIBER MAT TO THE STEEL POSTS WITH WIRE OR OTHER ACCEPTABLE MEANS AND STAPLED INTO THE BOTTOM AND SIDE SLOPES OF THE BASIN WITH 12″ STAPLES.

INSTALL TYPE 2 GEOTEXTILE ON SIDESLOPES AND BOTTOM OF BASIN AT INLET AS SHOWN IN THE DETAIL.

USE THE TYPICAL SECTION SHOWN FOR THE BORROW PIT DEWATERING BASIN AS A GUIDE. THE BASIN MAY HAVE ANY TYPE CONFIGURATION AS LONG AS SUFFICIENT VOLUME IS PROVIDED AND PROVISIONS ARE MADE FOR A NON-PERFORATED RISER.

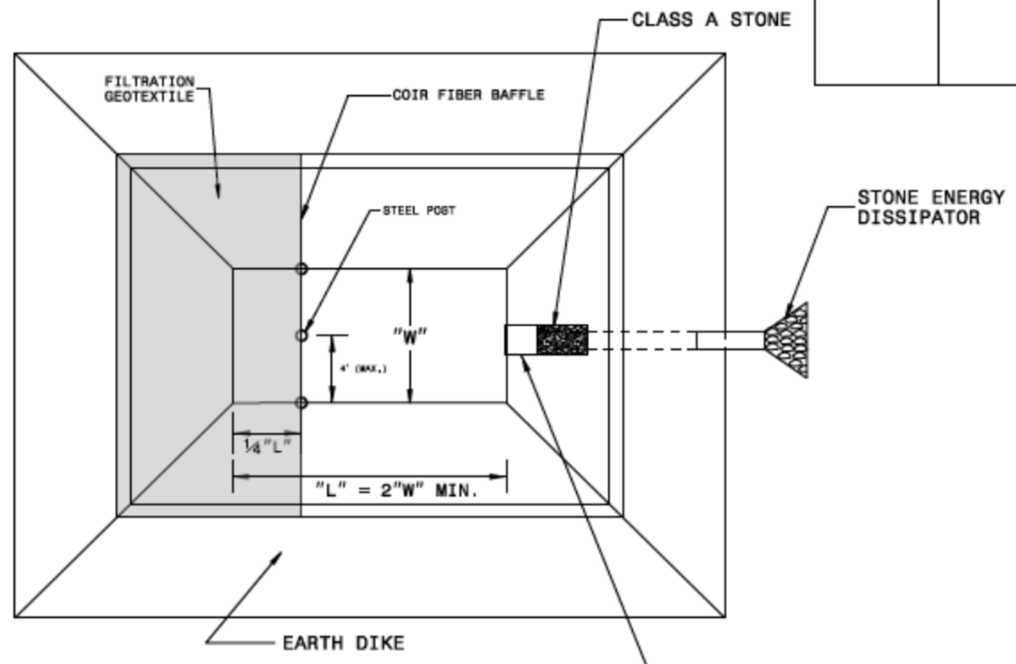
DO NOT EXCEED 3½ FT. IN HEIGHT FOR THE EARTH DIKES REQUIRED FOR BORROW PIT DEWATERING BASIN.

THE BORROW PIT DEWATERING BASIN SIZE IS VARIABLE AND DEPENDENT ON SPECIFIC SITE REQUIREMENTS AS WELL AS PROPOSED CONSTRUCTION OPERATIONS.

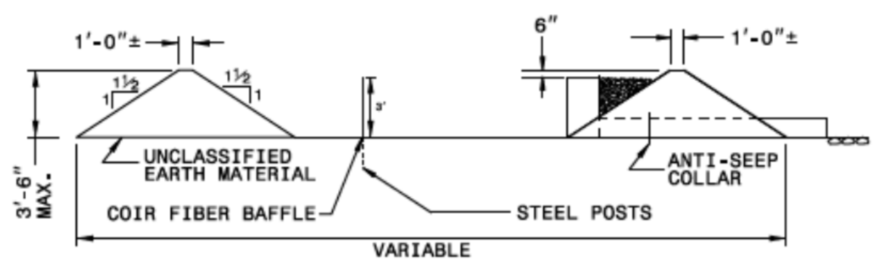
SUBMIT THE SIZE, LOCATION AND RISER PIPE MATERIAL FOR APPROVAL PRIOR TO CONSTRUCTION.

PUMP THE EFFLUENT INTO THE BORROW PIT DEWATERING BASIN TO A MAXIMUM DEPTH OF 6 IN. BELOW TOP OF EARTH DIKE.

PROVIDE A STONE ENERGY DISSIPATOR PAD AT THE OUTLET OF THE PUMP DISCHARGE HOSE AND OUTLET OF THE RISER BARREL IN ACCORDANCE WITH ROADWAY STANDARD DRAWING 876.02 FOR OUTLET W/O DITCH.



PLAN

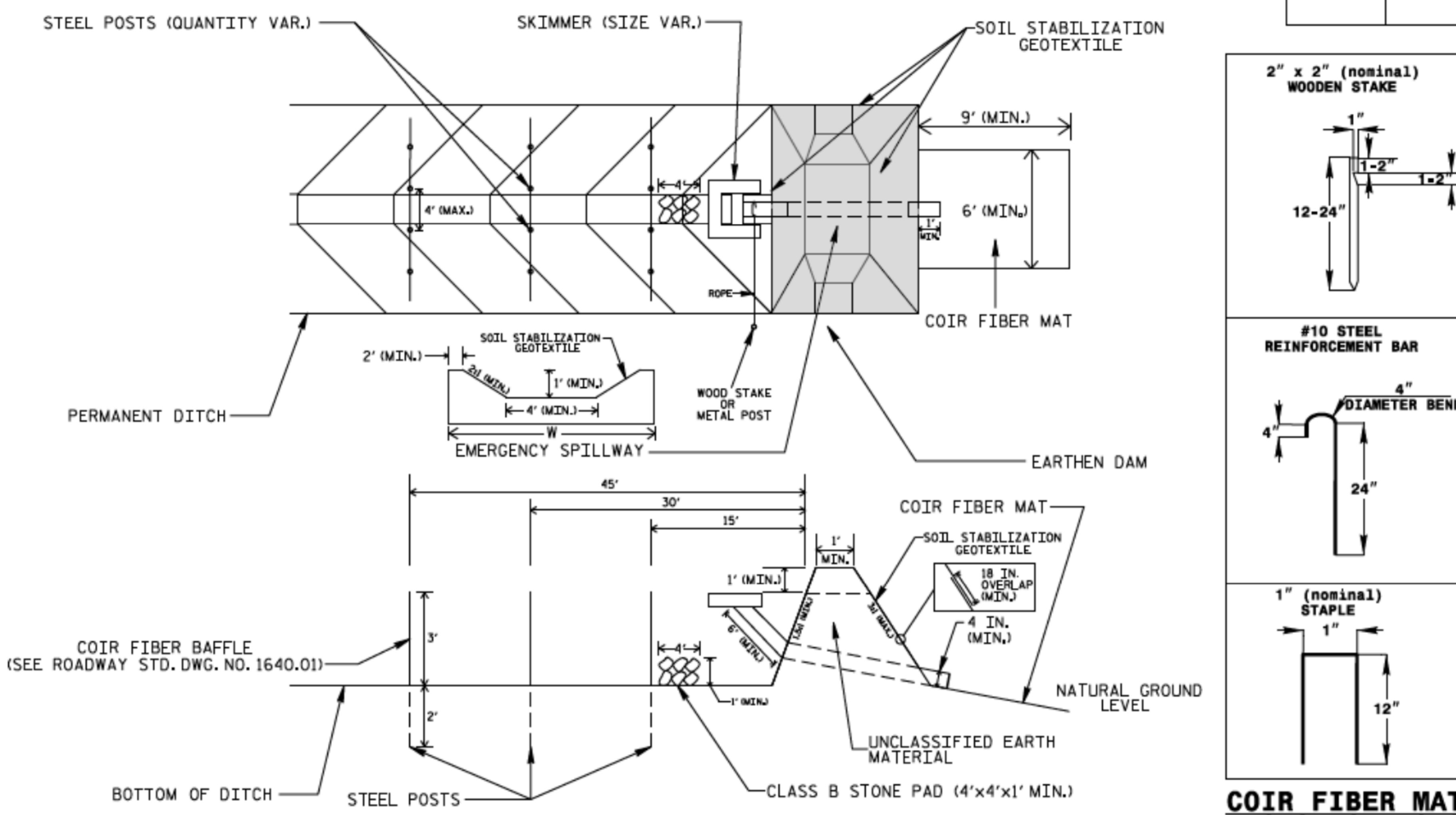


TYPICAL SECTION VIEW

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
X-XXXX	EC-2H

EARTHEN DAM WITH SKIMMER



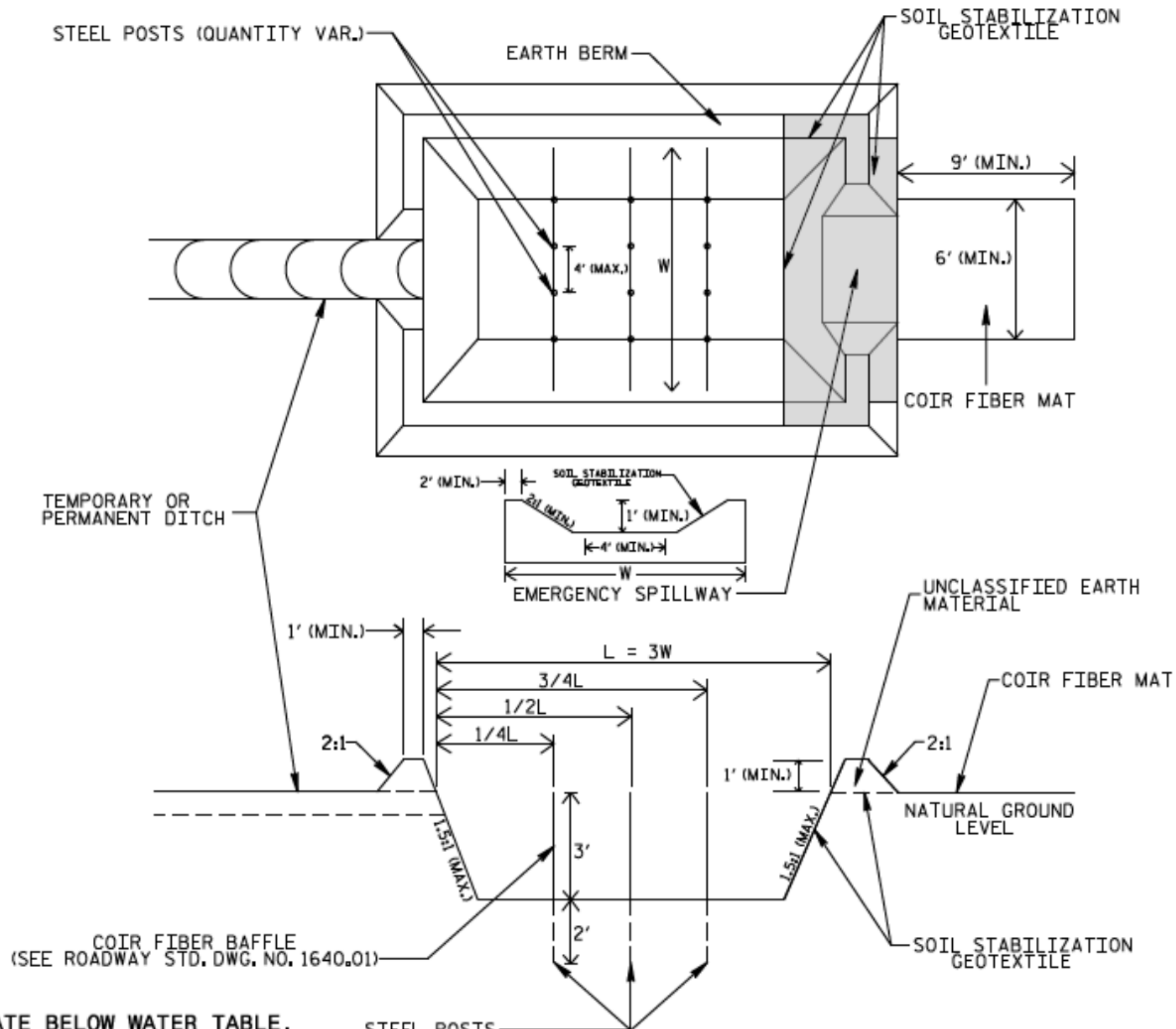
NOTES

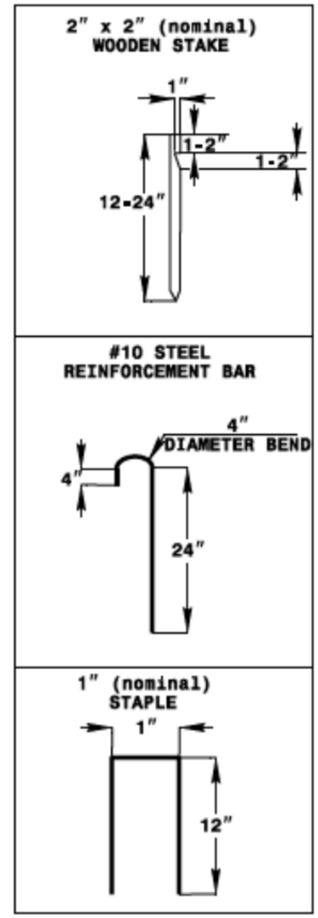
1. LIMIT EARTHEN DAM HEIGHT TO 5 FT.
2. DETERMINE EMERGENCY SPILLWAY LENGTH (FT.) USING Q/0.8, WHERE Q IS FLOW RATE (CFS) INTO BASIN.
3. SOIL STABILIZATION GEOTEXTILE FOR EMERGENCY SPILLWAY SHALL BE ONE CONTINUOUS PIECE OF MATERIAL OR OVERLAPPED 18 IN. (MIN.).

NOT TO SCALE

INFILTRATION BASIN WITH BAFFLES DETAIL

PROJECT REFERENCE NO.	SHEET NO.
B-4415	EC-2C
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER





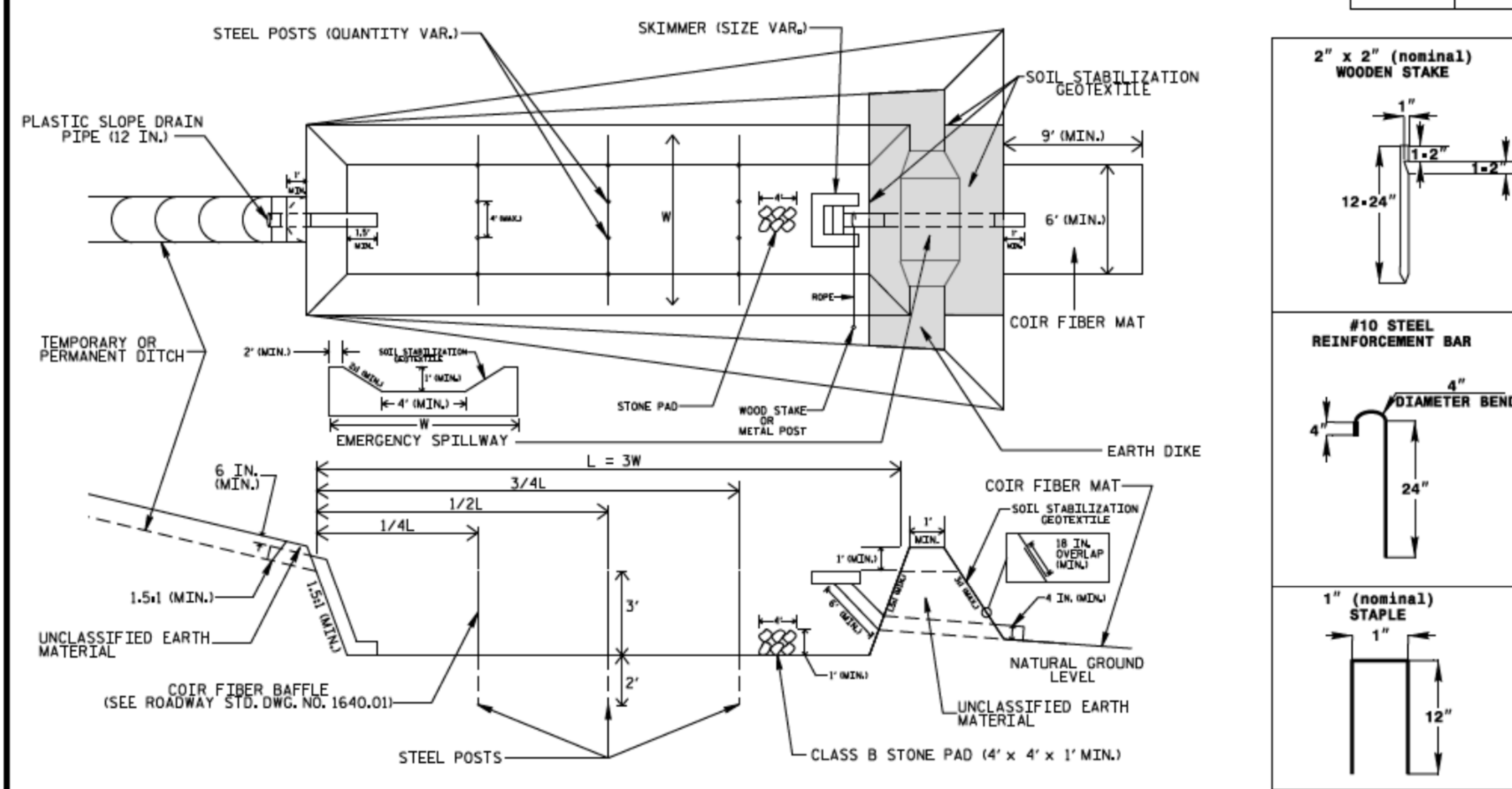
COIR FIBER MAT ANCHOR OPTIONS

NOTES

1. DO NOT EXCAVATE BELOW WATER TABLE.
2. LIMIT EARTH BERM HEIGHT TO 3 FT.
3. AVOID COMPACTING BOTTOM OF BASIN.
4. FOR BASIN DEPTH OF 3 FT., THE MINIMUM BASIN WIDTH SHALL BE 9 FT.
5. DETERMINE EMERGENCY SPILLWAY LENGTH (FT.) USING Q/0.8, WHERE Q IS FLOW RATE (CFS) INTO BASIN.

NOT TO SCALE

SKIMMER BASIN WITH BAFFLES DETAIL



COIR FIBER MAT ANCHOR OPTIONS

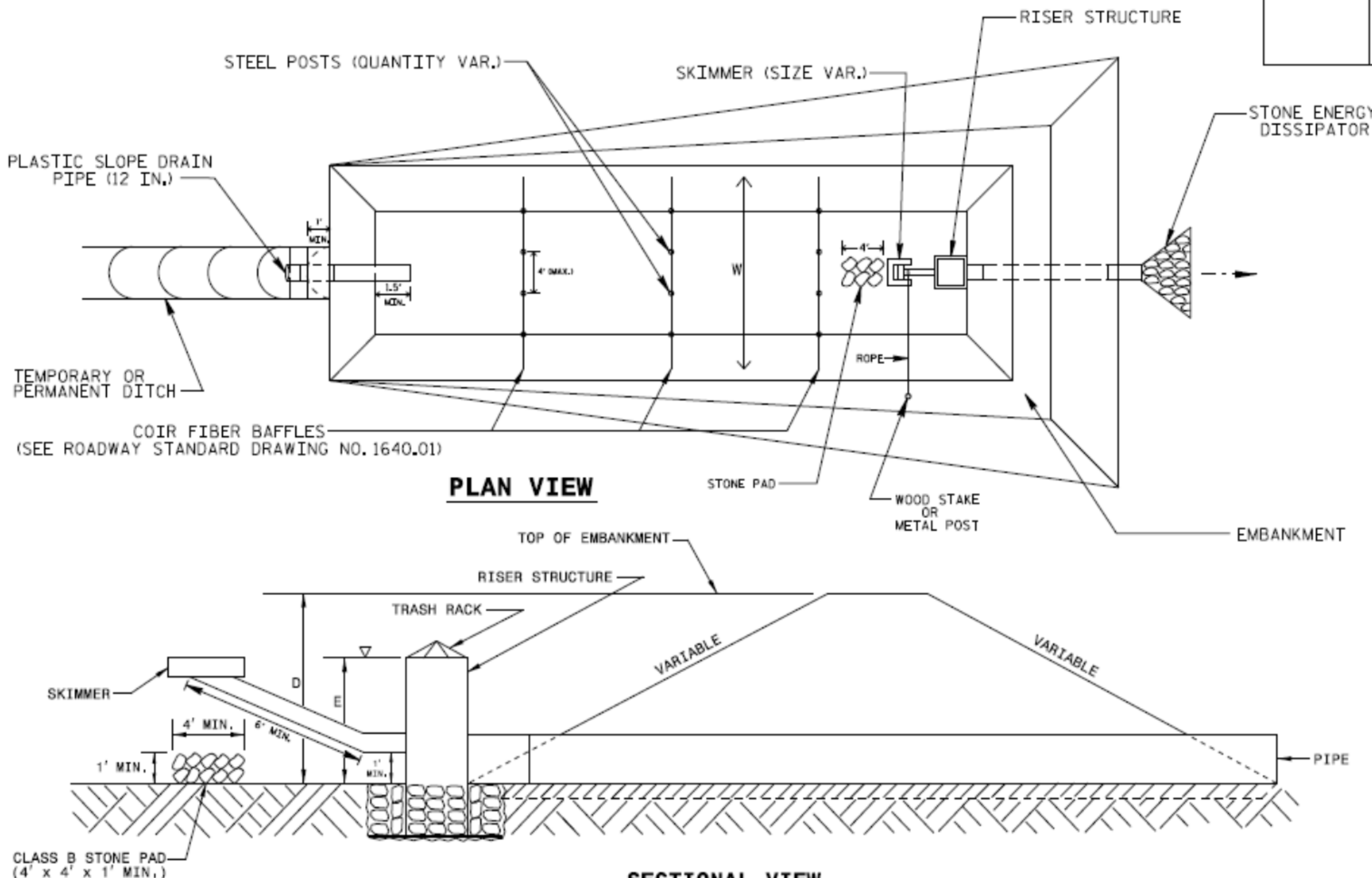
NOTES

1. SEED AND PLACE MATTING FOR EROSION CONTROL ON INTERIOR AND EXTERIOR SIDESLOPES.
2. LIMIT EARTH DIKE HEIGHT TO 5 FT.
3. FOR BASIN DEPTH OF 3 FT., THE MINIMUM BASIN WIDTH SHALL BE 9 FT.
4. DETERMINE EMERGENCY SPILLWAY LENGTH (FT.) USING Q/0.8, WHERE Q IS FLOW RATE (CFS) INTO BASIN.
5. PLASTIC SLOPE DRAIN PIPE AT INLET OF BASIN MAY BE REPLACED BY FILTRATION GEOTEXTILE AS DIRECTED.
6. SOIL STABILIZATION GEOTEXTILE FOR EMERGENCY SPILLWAY SHALL BE ONE CONTINUOUS PIECE OF MATERIAL OR OVERLAPPED 18 IN. (MIN.).

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
X-XXXX	EC-2D
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STORMWATER BASIN WITH SKIMMER



PLAN VIEW

SECTIONAL VIEW

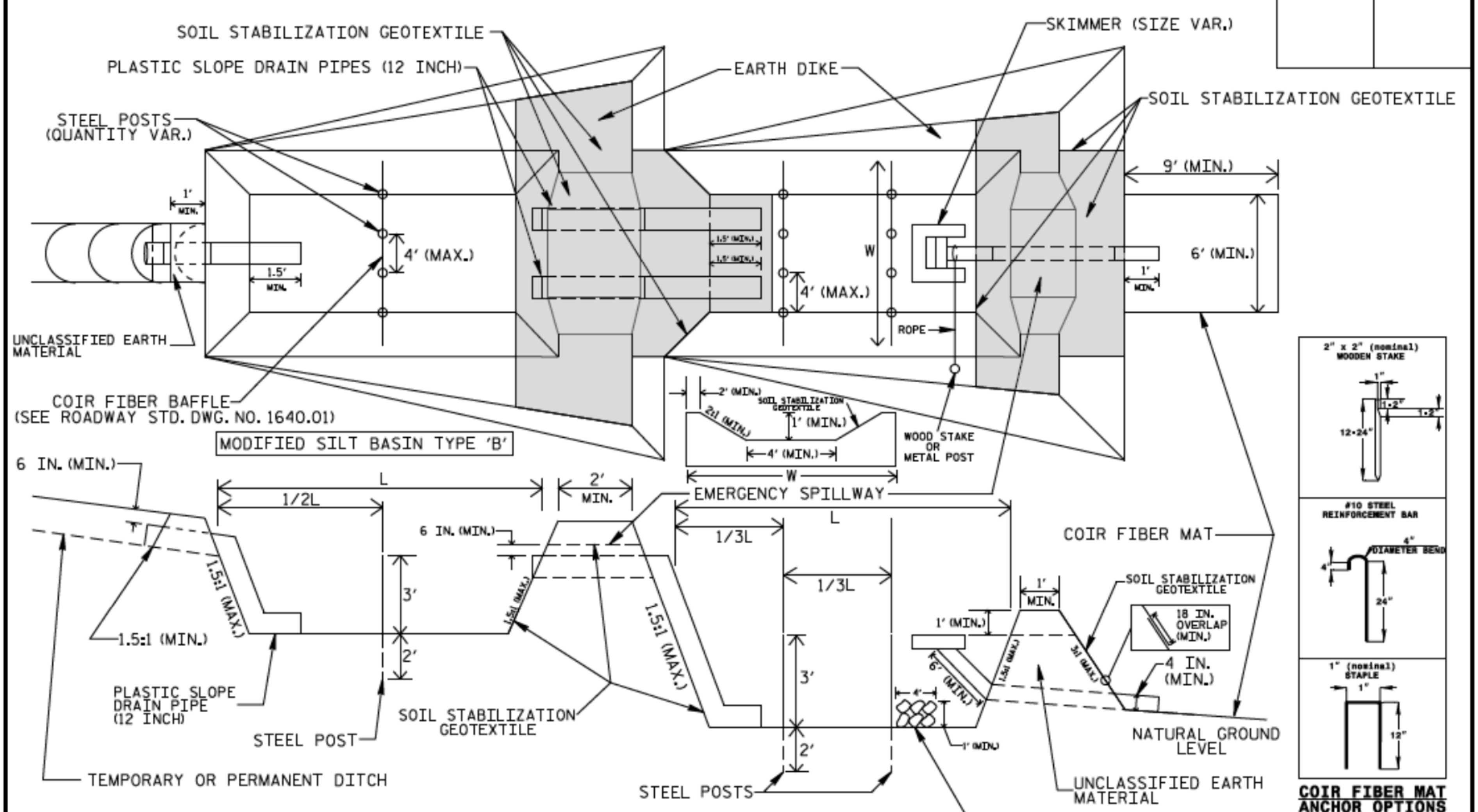
NOTES

1. SEED AND PLACE MATTING FOR EROSION CONTROL ON INTERIOR AND EXTERIOR SIDESLOPES.
2. INSTALL A MINIMUM OF 3 COIR FIBER BAFFLES IN ACCORDANCE WITH ROADWAY STD. DRAWING 1640.01.
3. INSTALL SKIMMER AND COUPLING TO RISER STRUCTURE OR DIRECTLY INTO EMBANKMENT 1 FT. FROM BOTTOM OF BASIN.
4. THE ARM PIPE SHALL HAVE A MINIMUM LENGTH OF 6 FT. BETWEEN THE SKIMMER AND COUPLING.
5. PLASTIC SLOPE DRAIN PIPE AT INLET OF BASIN MAY BE REPLACED BY FILTRATION GEOTEXTILE AS DIRECTED.
6. THE DIFFERENCE BETWEEN LENGTHS "D" AND "E" REPRESENT THE FREEBOARD AND SHOULD BE 1 FT. MINIMUM.

NOT TO SCALE

PROJECT REFERENCE NO. X-XXXX SHEET NO. EC-2C

TIERED SKIMMER BASIN DETAIL

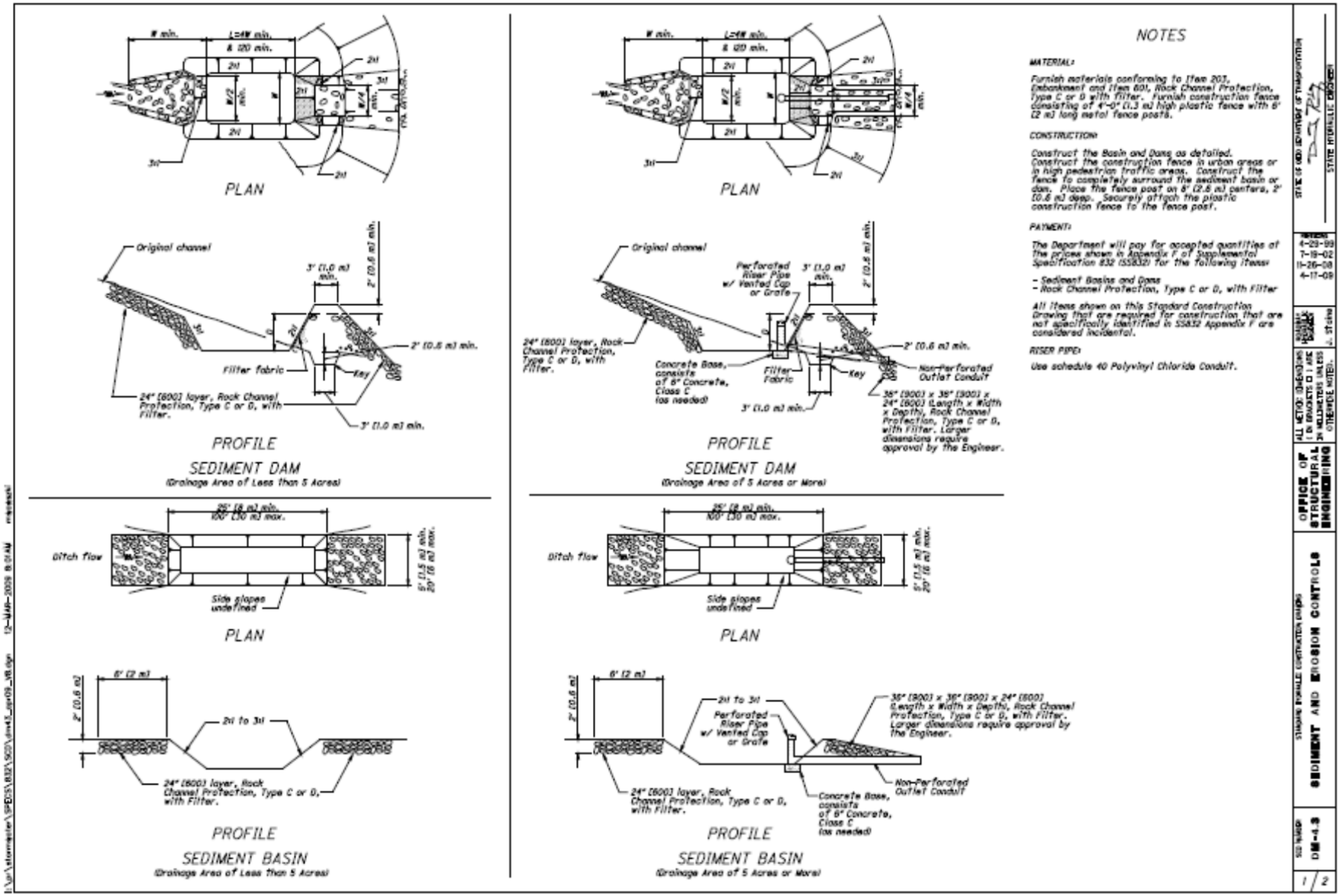


NOTES

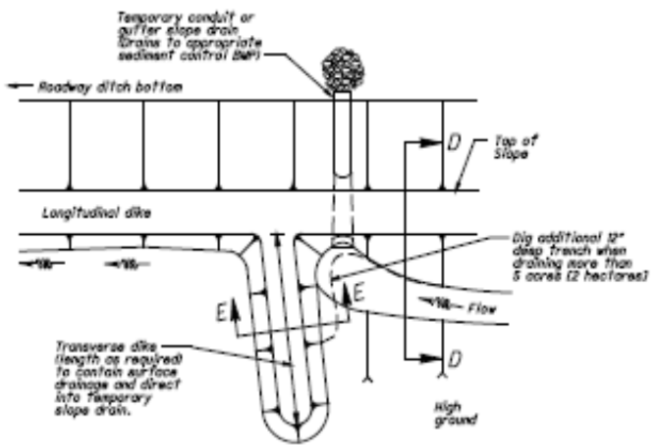
1. SEED AND PLACE MATTING FOR EROSION CONTROL ON INTERIOR AND EXTERIOR SIDESLOPES OF BASINS.
2. LIMIT HEIGHT OF EARTH DIKES TO 5 FT.
3. ADDITIONAL MODIFIED SILT BASINS TYPE 'B' MAY BE NEEDED DEPENDING ON SLOPE.
4. FOR BASIN DEPTHS OF 3FT., THE MINIMUM BASIN WIDTHS SHALL BE 9 FT.
5. DETERMINE EMERGENCY SPILLWAY LENGTHS (FT.) USING Q/0.8, WHERE Q IS FLOW RATE (CFS) INTO UPPER BASIN.
6. SOIL STABILIZATION GEOTEXTILE FOR EMERGENCY SPILLWAYS SHALL BE ONE CONTINUOUS PIECE OF MATERIAL OR OVERLAPPED 18 IN. (MIN.).

NOT TO SCALE

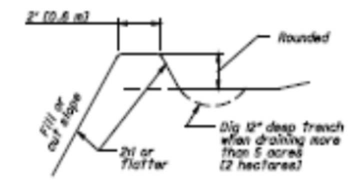
Ohio:



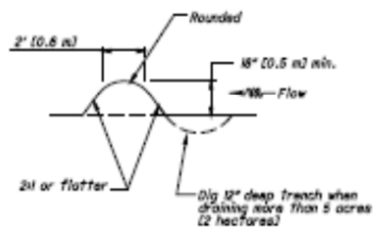
DIKES AND SLOPE DRAINS



PLAN VIEW



SECTION D-D



SECTION E-E

NOTES

MATERIAL:

Furnish materials conforming to Item 203, Embankment and Item 601, Rock Channel Protection, Type C or D, without filter.

Furnish the following for the slope drains: corrugated steel pipe, corrugated or smooth plastic pipe, reinforcing bars or fence posts.

CONSTRUCTION:

Construct as detailed. Compact the dike to 85% of Standard Proctor.

Use reinforcing bars or fence posts to tie down the slope drains and to keep the pipe from moving.

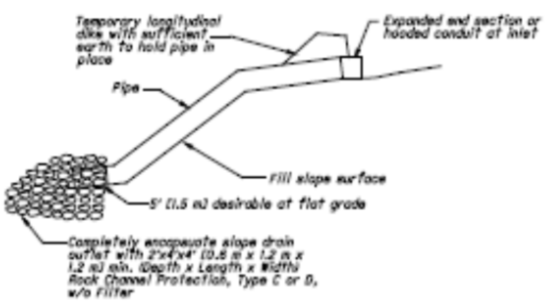
Ensure that the water entering the slope drain inlet does not erode or degrade the dike section containing the temporary conduit.

PAYMENT:

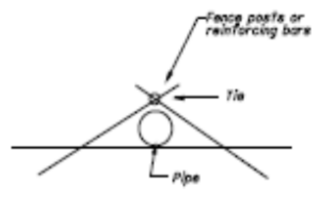
The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- Slope Drains
- Dikes
- Rock Channel Protection, Type C or D, without Filter

All items shown on this Standard Construction Drawing that are required for construction that are not specifically identified in SS832 Appendix F are considered incidental.



CONDUIT SLOPE DRAIN

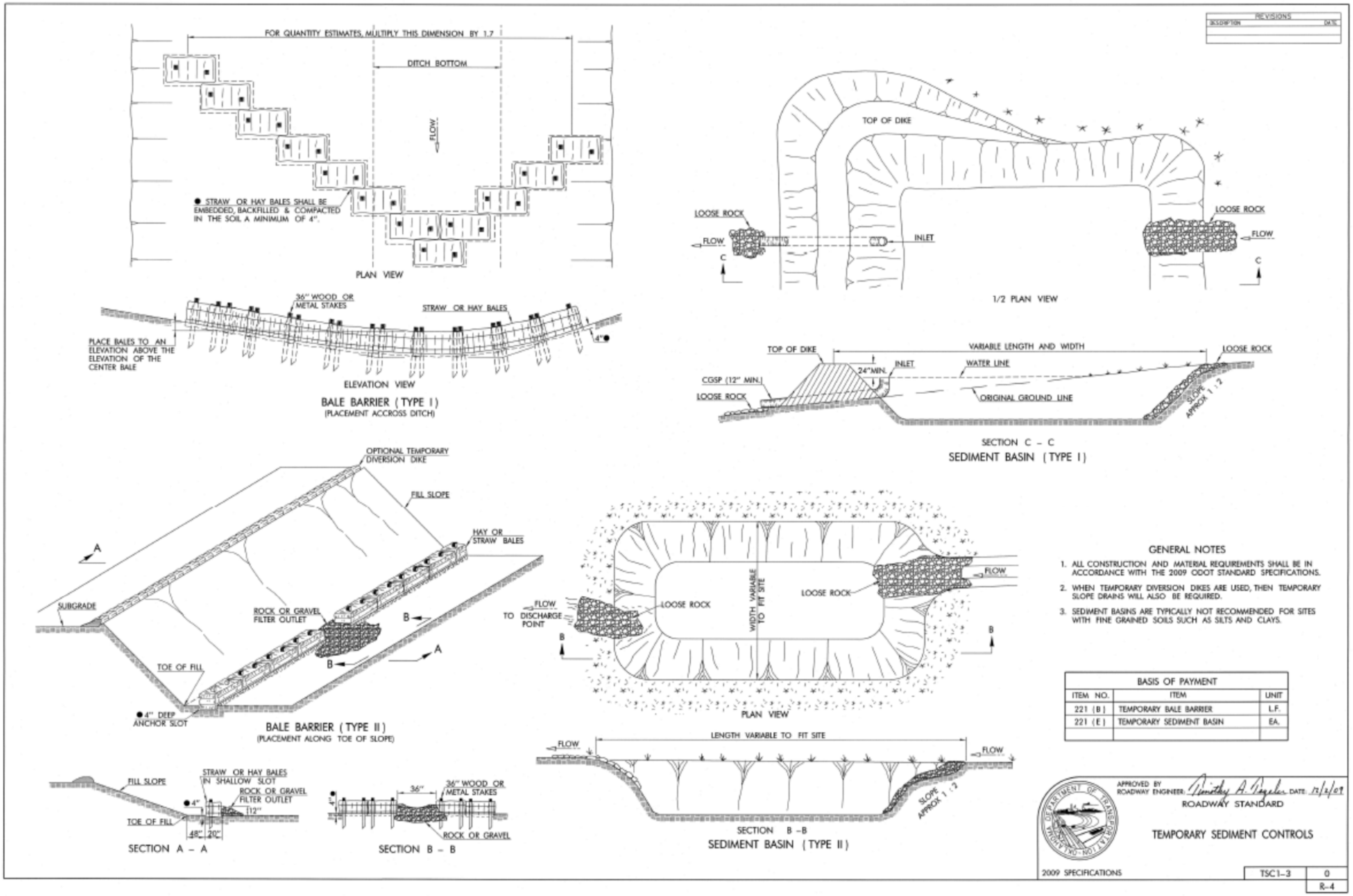


TIE-DOWN SLOPE DRAIN

TEMPORARY SLOPE DRAINS RECOMMENDED SIZES		
AREA in acres [hectares]	PIPE SIZES	
	Smooth	Corrugated
0-4 [0-1.6]	6" [150]	6" [150]
4-8 [1.6-3.2]	8" [200]	12" [300]
8-12 [3.2-4.9]	10" [250]	15" [375]

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER
REVISIONS 4-29-99 7-19-02 11-26-08 4-17-09
ALL METRIC DIMENSIONS [ ] IN BRACKETS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
OFFICE OF STRUCTURAL ENGINEERING
STANDARD HYDRAULIC CONSTRUCTION DRAWING
SEDIMENT AND EROSION CONTROLS
DM-4.3
2/2

Oklahoma:



REVISIONS
FOR QUANTITY ESTIMATES, MULTIPLY THIS DIMENSION BY 1.7
DITCH BOTTOM
FLOW
STRAW OR HAY BALES SHALL BE EMBEDDED, BACKFILLED & COMPACTED IN THE SOIL A MINIMUM OF 4".
PLAN VIEW
36" WOOD OR METAL STAKES
STRAW OR HAY BALES
PLACE BALES TO AN ELEVATION ABOVE THE ELEVATION OF THE CENTER BALE
ELEVATION VIEW
BALE BARRIER (TYPE I)
(PLACEMENT ACCROSS DITCH)
TOP OF DIKE
LOOSE ROCK
FLOW
INLET
1/2 PLAN VIEW
VARIABLE LENGTH AND WIDTH
24" MIN.
WATER LINE
CGSP (12" MIN.)
ORIGINAL GROUND LINE
SLOPE APPROX 1 : 2
SECTION C – C
SEDIMENT BASIN (TYPE I)
OPTIONAL TEMPORARY DIVERSION DIKE
FILL SLOPE
HAY OR STRAW BALES
SUBGRADE
ROCK OR GRAVEL FILTER OUTLET
TOE OF FILL
4" DEEP ANCHOR SLOT
BALE BARRIER (TYPE II)
(PLACEMENT ALONG TOE OF SLOPE)
TO DISCHARGE POINT
WIDTH VARIABLE TO FIT SITE
PLAN VIEW
GENERAL NOTES
1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. WHEN TEMPORARY DIVERSION DIKES ARE USED, THEN TEMPORARY SLOPE DRAINS WILL ALSO BE REQUIRED.
3. SEDIMENT BASINS ARE TYPICALLY NOT RECOMMENDED FOR SITES WITH FINE GRAINED SOILS SUCH AS SILTS AND CLAYS.
BASIS OF PAYMENT
ITEM NO. | ITEM | UNIT
221 (B) | TEMPORARY BALE BARRIER | L.F.
221 (E) | TEMPORARY SEDIMENT BASIN | EA.
LENGTH VARIABLE TO FIT SITE
STRAW OR HAY BALES IN SHALLOW SLOT
ROCK OR GRAVEL FILTER OUTLET
12"
48"
20"
SECTION A – A
36"
ROCK OR GRAVEL
SECTION B – B
SECTION B – B
SEDIMENT BASIN (TYPE II)
APPROVED BY ROADWAY ENGINEER:
DATE:
ROADWAY STANDARD
TEMPORARY SEDIMENT CONTROLS
2009 SPECIFICATIONS
TSC1-3
0
R-4

South Carolina:

REFERENCES

NATIONAL DOCUMENTS

AASHTO M294, AASHTO M196, AASHTO M36

SCDOT DOCUMENTS

SC-M-714 PERMANENT PIPE CULVERTS. SECTION 715 TEMPORARY PIPE CULVERTS

RELATED DRAWINGS & KEYWORDS

PRECONSTRUCTION SUPPORT ENGINEER

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER NO. 8858 EDWIN SYLVESTER EARGLE, II

SIGNATURE

MARCH 3, 2008

DATE

#	DATE	CHK	DESCRIPTION
6			
5			
4			
3			
2			
1			
0	3/2008	DSO	GENERAL REVISIONS

SCDOT

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
DESIGN STANDARDS OFFICE
955 PARK STREET
ROOM 405
COLUMBIA, SC 29201

STANDARD DRAWING

SEDIMENT CONTROL STRUCTURE AND BASIN

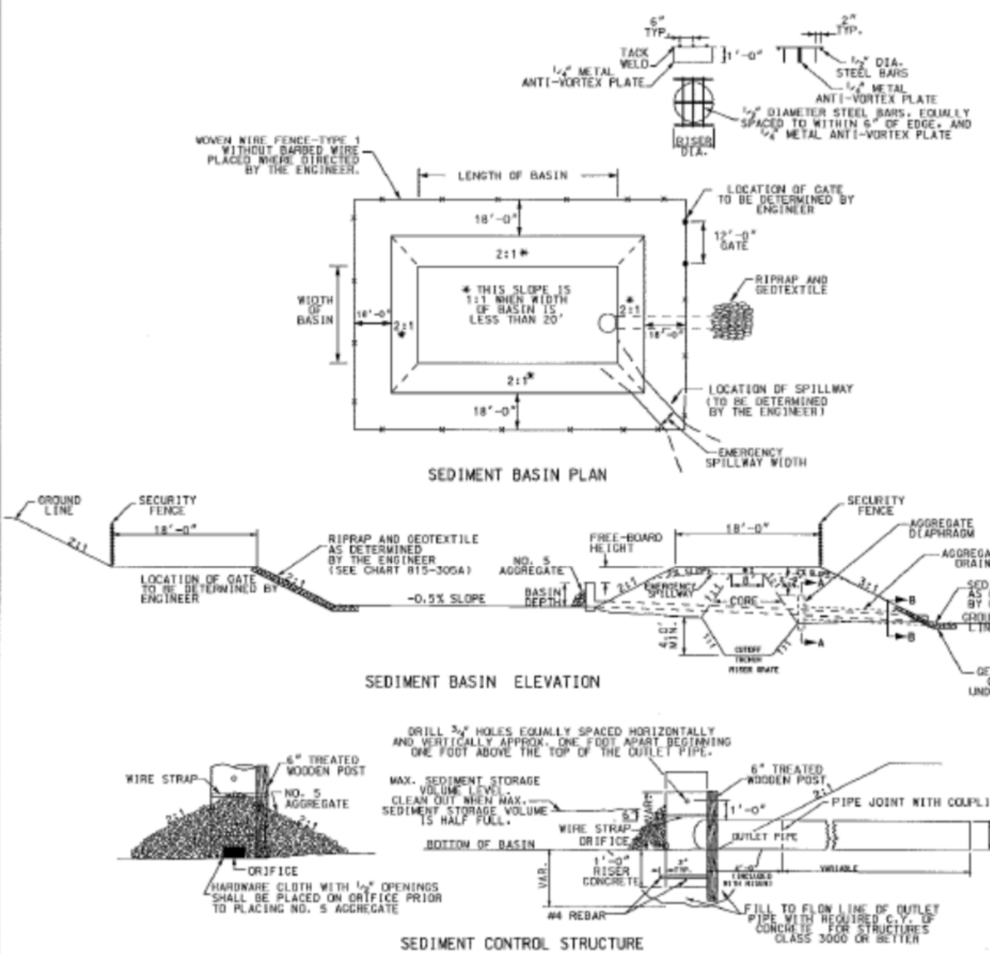
815-305-00

EFFECTIVE LETTING DATE MAY 2008

CHART 815-305B SEDIMENT CONTROL STRUCTURES

SEDIMENT CONTROL STRUCTURE SIZE (RISER DIA. X OUTLET DIA.)	FREEBOARD HEIGHT	EMERGENCY SPILLWAY DEPTH(✱)	OUTLET RIPRAP CONTROL	ALLOWABLE PIPE MATERIAL		DIAMETER OF ORIFICE	✱RISER CONCRETE (C.Y.)	AGGREGATE DIAPHRAGM
				TEMPORARY	PERMANENT			
24" X 18"	2'-0"	1'-0"	PAD	SEE SECTION 715 OF THE SCDOT STANDARD SPECS. TEMPORARY PIPE CULVERTS	SEE SC-M-714 SCDOT SUPPLEMENTAL TECHNICAL SPECIFICATION PERMANENT PIPE CULVERTS	4"	1	4'-6"x4'-6"
30" X 24"	2'-0"	1'-0"	PAD			4"	2	6'-0"x6'-0"
36" X 30"	4'-0"	2'-0"	STILLING BASIN			4"	3	7'-6"x7'-6"
48" X 36"	4'-0"	2'-0"	STILLING BASIN			6"	6	9'-0"x9'-0"
54" X 42"	4'-0"	2'-0"	STILLING BASIN			6"	9	10'-6"x10'-6"
60" X 48"	4'-0"	2'-0"	STILLING BASIN			6"	12	12'-0"x12'-0"

✱ FOR DEPTH OF BASIN GREATER THAN 3 OUTLET PIPE DIAMETERS. CONCRETE VOLUMES NEED TO BE CALCULATED



NOTES:

1. ALL AREAS OF THE SEDIMENT BASINS SHALL BE SEEDED EXCEPT FOR THE BOTTOM OF THE BASINS.
2. CONSTRUCTION, MAINTENANCE, AND BACK FILLING OF SEDIMENT BASIN IS TO BE INCLUDED IN THE PRICE BID FOR SILT BASIN. EACH ACTIVITY ABOVE WILL BE MEASURED AND PAID FOR SEPARATELY.
3. ALL BASINS AND SLOPES WILL BE SHOWN ON PLAN SHEETS.
4. EMERGENCY SPILLWAY SHALL BE A RUN-AROUND CONSTRUCTED ON EXISTING GROUND.
5. PERMANENT SEDIMENT CONTROL BASINS AS DETERMINED BY THE USE OF A PERMANENT SEDIMENT CONTROL STRUCTURE WILL BE RETAINED AND MAINTAINED AFTER COMPLETION OF THE PROJECT.
6. PAYMENT FOR TEMPORARY SEDIMENT CONTROL STRUCTURES INCLUDES THE REMOVAL AND DISPOSAL OF THE STRUCTURE, PIPE AND ALL APPURTENANCES CONNECTED TO THE STRUCTURE, ALL AGGREGATE DIAPHRAGM, ALL RIPRAP, AND THE FENCE AND GATE THAT SURROUNDS THE BASIN.
7. GATE SHALL INCLUDE A METHOD OF KEEPING THE GATE CLOSED. LOCKING IS NOT NECESSARY.
8. PRICE BID ON SILT BASIN TO INCLUDE REMOVAL AND DISPOSAL OF HAND PLACED RIPRAP.
9. RISER GRATE, 1/2" HARDWARE CLOTH, ANTI-VORTEX PLATE, 6" WOODEN POST WITH WIRE STRAP, AND NO. 5 AGGREGATE TO BE INCLUDED IN BID PRICE OF SEDIMENT CONTROL STRUCTURE.
10. COST OF CONCRETE FOR STRUCTURES AND REINFORCING STEEL SHALL BE INCLUDED IN THE PRICE BID FOR SEDIMENT CONTROL STRUCTURE.
11. BASINS SHALL BE INSPECTED EVERY 7 DAYS.
12. BASIN SHALL BE CLEANED OUT WHEN MAXIMUM SEDIMENT STORAGE VOLUME IS HALF FULL.
13. KEY AND CORE SHALL BE CONSTRUCTED ON ALL EMBANKMENT AREAS. MATERIAL USED SHALL BE CLAY OR OTHER IMPERVIOUS MATERIALS THAT MEET THE FOLLOWING AASHTO CLASSIFICATIONS: A-2-6, A-2-7, A-6, AND A-7. IF BORROW MATERIAL IS NECESSARY TO CONSTRUCT THE EMBANKMENT TO MEET THESE SPECIFICATIONS, BORROW MATERIAL SHALL BE PAID FOR AS SILT BASIN.
14. THE GRADATION CLASS OF SEDIMENT DAM RIRAP SHALL BE CLASS B.
15. THE PAY ITEMS SHALL BE:

SILT BASIN ____ CY
WOVEN WIRE FENCE TYPE 1 WITHOUT BARBED WIRE ____ LF
12' WIDE FARM FENCE GATE (48" HT.) ____ EA
TEMPORARY PIPES:
__" CORR. STEEL PIPE CUL. (__") ____ LF
__" CORR. ALUM. ALLOY PIPE CUL. (__") ____ LF
__" CORR. HDPE PIPE TYPE (C OR S) TEMP. ____ LF
__" TEMPORARY FLEXIBLE PIPE SLOPE DRAIN ____ LF
PERMANENT PIPES:
__" CORR. HDPE PIPE CULVERT (TYPE S) ____ LF
__" SP. RIB. ALUM. PIPE - (__) ____ LF
__" CR. AL./ALY. P. CUL-(__) ____ LF
__" RC PIPE CUL. - CLASS (__) ____ LF
SEDIMENT DAM RIRAP ____ TON
GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP (CLASS 2) TYPE ____ SY
TEMPORARY __" X __" SEDIMENT CONTROL STRUCTURE ____ EA
PERMANENT __" X __" SEDIMENT CONTROL STRUCTURE ____ EA
TEMPORARY SEEDING ____ MSY
SEEDING ____ MSY
FERTILIZER (10-10-10) ____ TON
LIME ____ TON
NITROGEN ____ TON
AGGREGATE DIAPHRAGM ____ CY
TEMPORARY VEGETATION ____ MSY
PERMANENT VEGETATION ____ MSY

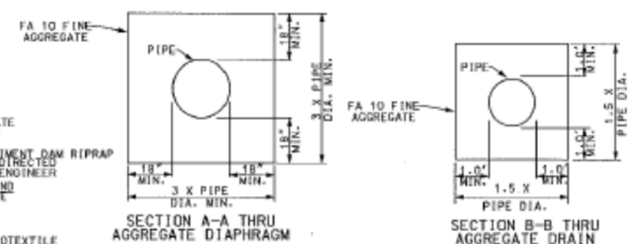
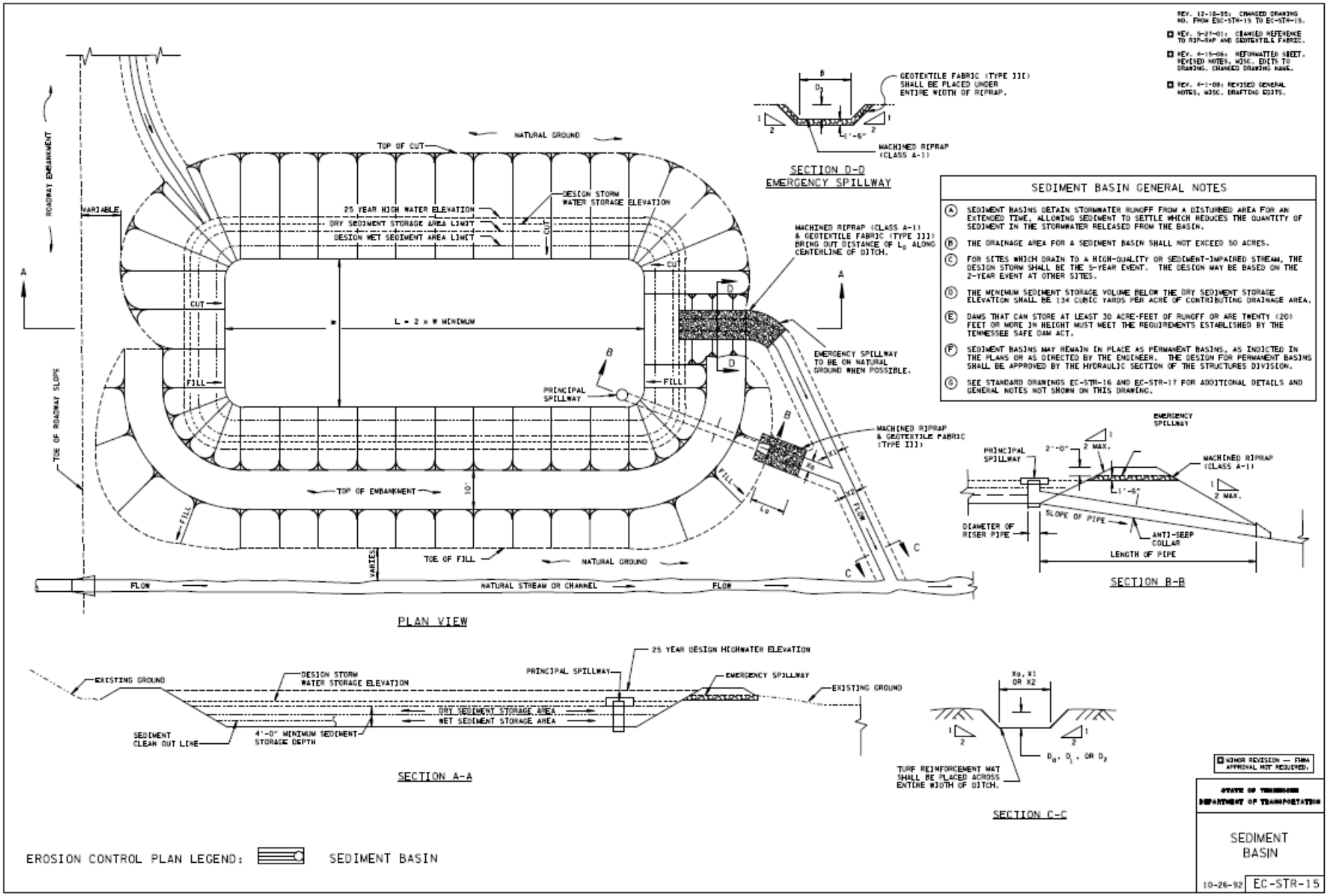


CHART 815-305A RIPRAP PLACEMENT

CLASS	D_{50} (FT)	MINIMUM THICKNESS (FT)
A	0.50	1.00
B	0.75	1.50
C	1.30	2.60
D	1.80	3.60
E	2.25	4.50
F	2.85	5.70

THIS DRAWING IS NOT TO SCALE

Tennessee:



NATURAL GROUND
TOP OF CUT
ROADWAY EMBANKMENT
VARIABLE
25 YEAR HIGH WATER ELEVATION
DRY SEDIMENT STORAGE AREA LIMIT
DESIGN WET SEDIMENT AREA LIMIT
DESIGN STORM WATER STORAGE ELEVATION
CUT
FILL
L = 2 x W MINIMUM
W
PRINCIPAL SPILLWAY
TOP OF EMBANKMENT
TOE OF ROADWAY SLOPE
TOE OF FILL
VARIES
FLOW
NATURAL STREAM OR CHANNEL
MACHINED RIPRAP (CLASS A-1) & GEOTEXTILE FABRIC (TYPE III) BRING OUT DISTANCE OF L_0 ALONG CENTERLINE OF DITCH.
EMERGENCY SPILLWAY TO BE ON NATURAL GROUND WHEN POSSIBLE.
MACHINED RIPRAP & GEOTEXTILE FABRIC (TYPE III)
PLAN VIEW
GEOTEXTILE FABRIC (TYPE III) SHALL BE PLACED UNDER ENTIRE WIDTH OF RIPRAP.
MACHINED RIPRAP (CLASS A-1)
SECTION D-D
EMERGENCY SPILLWAY
SEDIMENT BASIN GENERAL NOTES
(A) SEDIMENT BASINS DETAIN STORMWATER RUNOFF FROM A DISTURBED AREA FOR AN EXTENDED TIME, ALLOWING SEDIMENT TO SETTLE WHICH REDUCES THE QUANTITY OF SEDIMENT IN THE STORMWATER RELEASED FROM THE BASIN.
(B) THE DRAINAGE AREA FOR A SEDIMENT BASIN SHALL NOT EXCEED 50 ACRES.
(C) FOR SITES WHICH DRAIN TO A HIGH-QUALITY OR SEDIMENT-IMPAIRED STREAM, THE DESIGN STORM SHALL BE THE 5-YEAR EVENT. THE DESIGN MAY BE BASED ON THE 2-YEAR EVENT AT OTHER SITES.
(D) THE MINIMUM SEDIMENT STORAGE VOLUME BELOW THE DRY SEDIMENT STORAGE ELEVATION SHALL BE 134 CUBIC YARDS PER ACRE OF CONTRIBUTING DRAINAGE AREA.
(E) DAMS THAT CAN STORE AT LEAST 30 ACRE-FEET OF RUNOFF OR ARE TWENTY (20) FEET OR MORE IN HEIGHT MUST MEET THE REQUIREMENTS ESTABLISHED BY THE TENNESSEE SAFE DAM ACT.
(F) SEDIMENT BASINS MAY REMAIN IN PLACE AS PERMANENT BASINS, AS INDICTED IN THE PLANS OR AS DIRECTED BY THE ENGINEER. THE DESIGN FOR PERMANENT BASINS SHALL BE APPROVED BY THE HYDRAULIC SECTION OF THE STRUCTURES DIVISION.
(G) SEE STANDARD DRAWINGS EC-STR-16 AND EC-STR-17 FOR ADDITIONAL DETAILS AND GENERAL NOTES NOT SHOWN ON THIS DRAWING.
EMERGENCY SPILLWAY
PRINCIPAL SPILLWAY
2 MAX.
MACHINED RIPRAP (CLASS A-1)
DIAMETER OF RISER PIPE
SLOPE OF PIPE
ANTI-SEEP COLLAR
LENGTH OF PIPE
SECTION B-B
25 YEAR DESIGN HIGHWATER ELEVATION
EXISTING GROUND
DESIGN STORM WATER STORAGE ELEVATION
PRINCIPAL SPILLWAY
EMERGENCY SPILLWAY
DRY SEDIMENT STORAGE AREA
WET SEDIMENT STORAGE AREA
SEDIMENT CLEAN OUT LINE
4'-0" MINIMUM SEDIMENT STORAGE DEPTH
SECTION A-A
TURF REINFORCEMENT MAT SHALL BE PLACED ACROSS ENTIRE WIDTH OF DITCH.
SECTION C-C
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
SEDIMENT BASIN
10-26-92
EC-STR-15
EROSION CONTROL PLAN LEGEND:
SEDIMENT BASIN

REV. 12-18-95: CHANGED DRAWING NO. FROM ESC-STR-16 TO EC-STR-16.

REV. 4-15-06: REFORMATTED SHEET. REVISED NOTES, MISC. EDITS TO DRAWING.

REV. 4-1-08: REVISED GENERAL NOTES AND CHANGED DRAWING NAME.

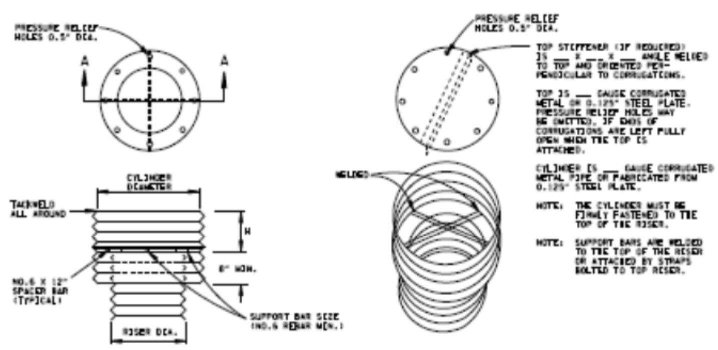
CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE DESIGN TABLE						
RISER DIA. (IN)	CYLINDER		HEIGHT (INCHES)	MINIMUM SUPPORT BAR	MINIMUM TOP	
	DIAMETER (INCHES)	THICKNESS (GAUGE)			THICKNESS	STIFFENER
12	18	16	6	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 ANGLE	16 GA. (F&C)	-
15	21	16	7	NO. 6 REBAR OR 1.5 X 1.5 X 0.19 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 6" X 1".

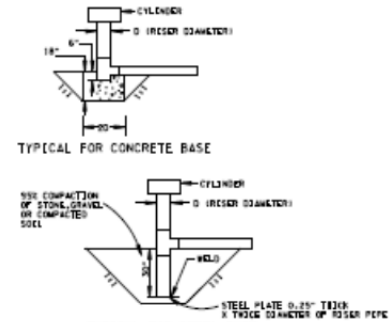
NOTE: C = CORRUGATED; F = FLAT.

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	68	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

(A1) UNASSEMBLED DIAPHRAGMS SHALL BE MARKED BY PAINTING OR TAGGING WHEN NECESSARY TO IDENTIFY MATCHING PAIRS TO SECURE A PROPER INSTALLATION.

(A2) THE LAP BETWEEN THE TWO HALF SECTIONS AND BETWEEN THE PIPE AND COUPLING BAND SHALL BE CAULKED WITH BITUMINOUS MASTIC AT TIME OF INSTALLATION. NEOPRENE GASKET 0.375" x 7" MINIMUM WIDTH MAY BE USED IN LIEU OF MASTIC.

(A3) ALL WELDS AND ALL HEAT AFFECTED AREAS ON ZINC COATED METAL SHALL BE THOROUGHLY CLEANED AND TREATED IN ACCORDANCE WITH SPECIFICATIONS (STEEL ONLY).

(A4) EACH DIAPHRAGM SHALL BE FURNISHED WITH TWO RODS AND NUTS AND TWO STANDARD TANK LUGS OR "L" LUGS FOR SECURING DIAPHRAGMS TO PIPE.

(A5) RODS FOR COLLAR COUPLING BANDS AND DIAPHRAGMS FOR 6" THRU 15" DIAMETER PIPE SHALL BE 0.375" DIAMETER AND FOR PIPE LARGER THAN 15" DIAMETER THE RODS SHALL BE 0.5" DIAMETER.

SEDIMENT BASIN GENERAL NOTES

(C1) THE LENGTH, L, AND WIDTH, W, OF THE BASIN MAY VARY TO CONFORM TO THE SPECIFIC SITE CONDITIONS, PROVIDED THE REQUIRED VOLUME IS MAINTAINED.

(C2) THE MINIMUM LENGTH TO WIDTH RATIO OF THE BASIN SHALL BE 2:1.

(C3) THE SEDIMENT STORAGE DEPTH SHALL BE A MINIMUM OF 4' - 0".

(C4) THE EMERGENCY SPILLWAY SHOULD BE LOCATED IN A CUT AREA WHENEVER POSSIBLE.

(C5) THE DIAMETER OF THE RISER SHALL BE DETERMINED BY THE RISER INFLOW CURVES SHOWN IN THE DESIGN DIVISION DRAINAGE MANUAL.

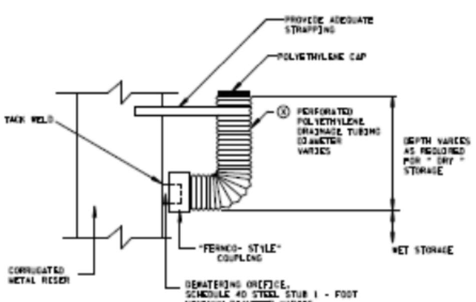
(C6) THE PRINCIPAL SPILLWAY CAPACITY SHALL BE BASED ON THE DESIGN STORM FREQUENCY WHEN AN EMERGENCY SPILLWAY IS USED, OR THE TWENTY-FIVE (25) YEAR STORM WHEN AN EMERGENCY SPILLWAY IS NOT USED. IF AN EMERGENCY SPILLWAY IS USED, IT SHALL BE DESIGNED FOR A 25-YEAR FLOOD. THE RIPRAP PLACED AT THE OUTFALL OF THE PRINCIPAL SPILLWAY OUTLET PIPE SHALL BE DESIGNED TO REMAIN STABLE UNDER THE FLOW CONDITIONS IMPOSED BY THE DESIGN PEAK FLOW RATE.

(C7) SEDIMENT BASIN VOLUME IS MEASURED FROM THE CREST OF THE PRINCIPAL SPILLWAY TO THE BOTTOM OF THE BASIN.

(C8) SEDIMENT SHALL BE REMOVED AND THE SEDIMENT BASIN RESTORED TO THE ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ½ OF THE WET STORAGE VOLUME. A SUITABLE MARKER SHALL BE INSTALLED IN THE BASIN TO INDICATE WHEN THE BASIN REQUIRES MAINTENANCE.

(C9) THE PIPE USED IN THE CONSTRUCTION OF THE PRINCIPAL SPILLWAY BARREL WILL BE PAID FOR IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 607, PIPE CULVERT AND STORM SEWERS.

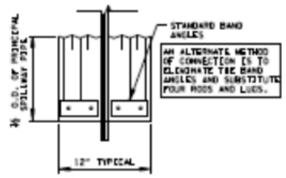
(C10) SEE STANDARD DRAWINGS EC-STR-15 AND EC-STR-17 FOR ADDITIONAL DETAILS AND GENERAL NOTES NOT SHOWN ON THIS DRAWING.



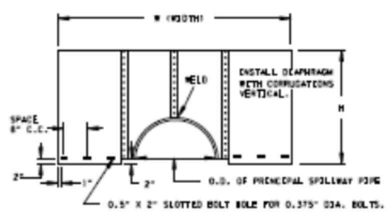
NOTE: WITH CONCRETE RISER, USE PVC SCHEDULE 40 STUB FOR DEWATERING ORIFICE

(X) 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

ANTI-SEEP COLLAR GENERAL NOTES

(B1) THE ANTI-SEEP COLLAR IS TO BE USED ON THE BARREL OF THE PRINCIPAL SPILLWAY TO REDUCE SEEPAGE LOSS AND PIPING FAILURE.

(B2) USE IF PIPE BARREL IS LARGER THAN 10 INCHES IN DIAMETER.

(B3) USE A MINIMUM OF ONE ANTI-SEEP COLLAR, IF THE EMBANKMENT IS 15 FEET OR LESS IN HEIGHT AND A MINIMUM OF TWO ANTI-SEEP COLLARS, IF THE EMBANKMENT IS GREATER THAN 15 FEET IN HEIGHT.

(B4) USE MAXIMUM SPACING BETWEEN COLLARS OF FOURTEEN TIMES THE PROJECTION OF THE COLLAR ABOVE THE PIPE, FROM THE DETAILS - THE COLLAR SPACING WOULD BE ONE - HALF THE DIAMETER OF THE PRINCIPAL SPILLWAY PIPE TIMES FOURTEEN.

(B5) COLLARS SHOULD NOT BE CLOSER THAN 2 FEET TO A PIPE JOINT.

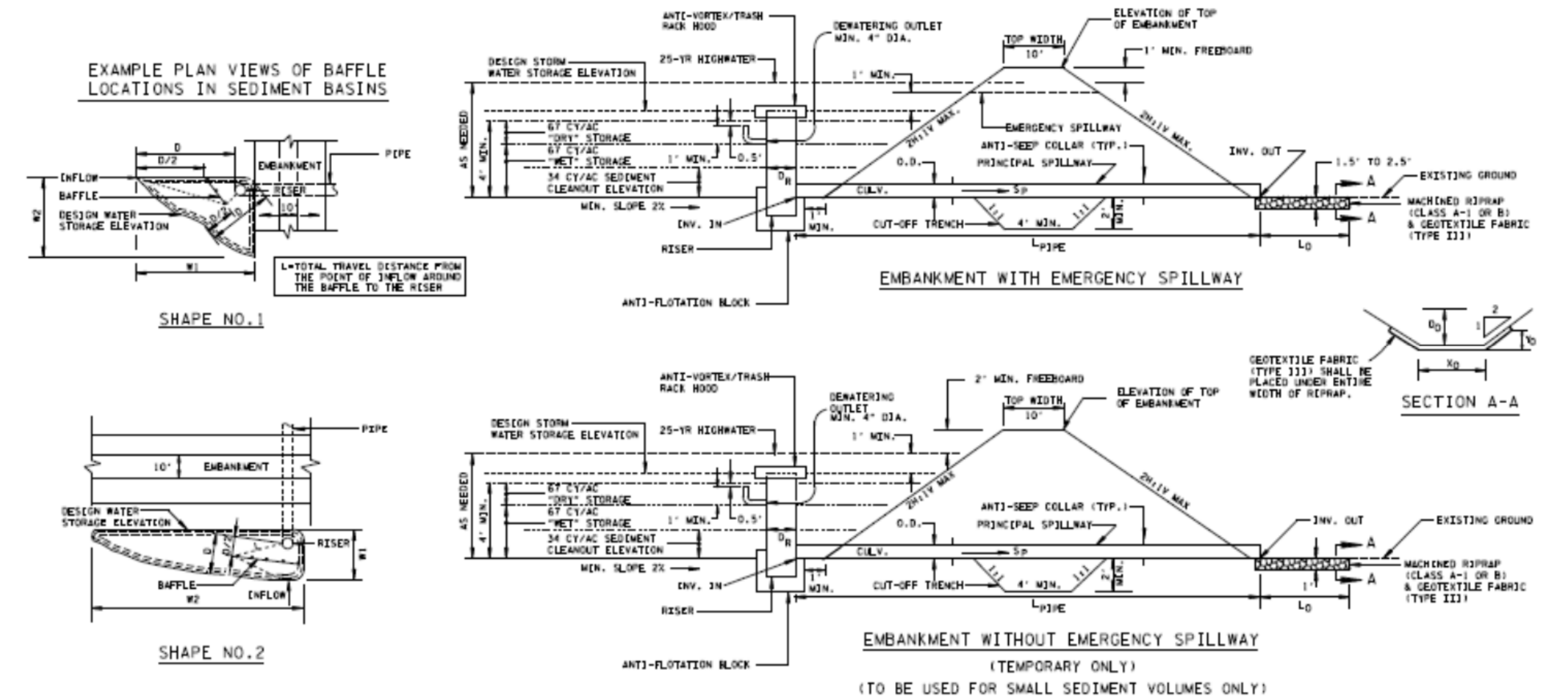
(B6) PRECAUTIONS SHOULD BE TAKEN TO ENSURE 95 % COMPACTION IS ACHIEVED AROUND THE COLLARS.

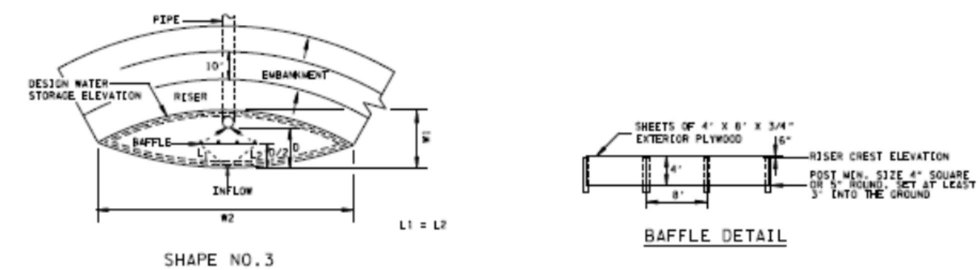
MINOR REVISION — FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SEDIMENT BASIN RISER AND COLLAR APPURTENANCES

10-26-92 | EC-STR-16





EROSION CONTROL PLAN LEGEND: SEDIMENT BASIN

SEDIMENT BASIN GENERAL NOTES

(A) BAFFLES SHALL BE 4 FEET X 8 FEET X ¾ INCH EXTERIOR PLYWOOD, TYPE "PLYFORM" GRADE BB, D, AND Es.

(B) 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.

(C) THE EXPOSED SLOPES OF THE SEDIMENT BASIN SHOULD BE STABILIZED WITH TEMPORARY SEEDING WITH MULCH OR OTHER STABILIZATION METHODS.

(D) 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
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.

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

REV. 12-10-95: CHANGED DRAWING NO. FROM ESC-STR-17 TO EC-STR-17.

REV. 5-27-01: CHANGED ITEM NO. 740-03.01 TO 740-10.03.

REV. 4-15-06: REFORMATTED SHEET, REVISED NOTES, MISC. EDITS TO DRAWING, CHANGED DRAWING NAME.

REV. 4-15-06: REVISED NOTES.

REV. 4-1-08: REVISED GENERAL NOTES, MINOR EDITS TO DRAWING, CHANGED DRAWING NAME, AND CHANGED LEGEND.

MINOR REVISION — FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SEDIMENT BASIN EMBANKMENT DETAILS

10-26-92 | EC-STR-17

REV. 12-18-95: CHANGED DRAWING NO. FROM ESC-STR-19 TO EC-STR-19.

REV. 5-27-01: CHANGED ITEM NO. 303-15.01 TO 303-10.01.

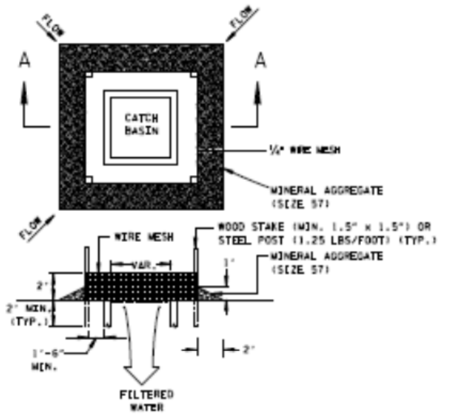
REV. 12-18-02: IN CATCH BASIN SILT FENCE SILT TRAP CHANGED TYPE OF SILT FENCE FROM SILT FENCE (WITHOUT BACKING) TO SILT FENCE (WITH BACKING) AND PAY ITEM FROM 209-08 TO 209-08.02.

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

REV. 4-15-06: REFORMATTED SHEET. REVISED NOTES. MISC. EDITS TO DRAWING.

REV. 4-1-08: REPLACED HAY BALE SILT TRAP, REVISED GENERAL NOTES, AND MISC. EDITS TO DRAWING.

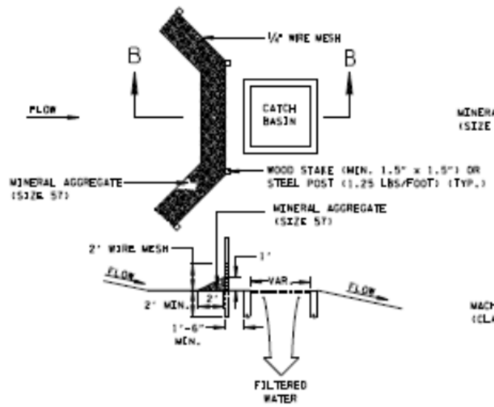
CATCH BASIN PROTECTION (TYPE B)



SECTION A-A

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

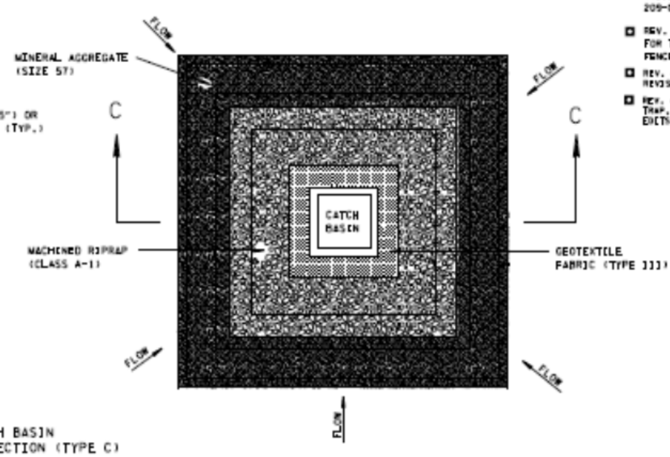
CATCH BASIN PROTECTION (TYPE C)



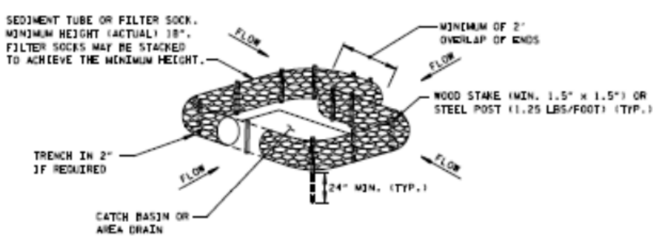
SECTION B-B

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

CATCH BASIN PROTECTION (TYPE A)

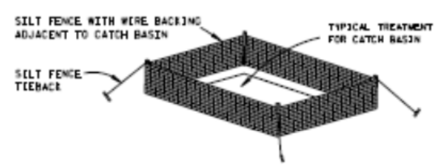


CATCH BASIN PROTECTION (TYPE D)

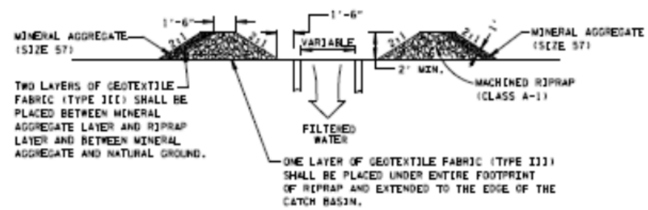


EROSION CONTROL PLAN LEGEND: (D) CATCH BASIN PROTECTION (TYPE D)

CATCH BASIN PROTECTION (TYPE E)



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



SECTION C-C

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 2 ACRES.

(D) ONLY GEOTEXTILE FABRIC (TYPE III) 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 1/4 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-37) 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.

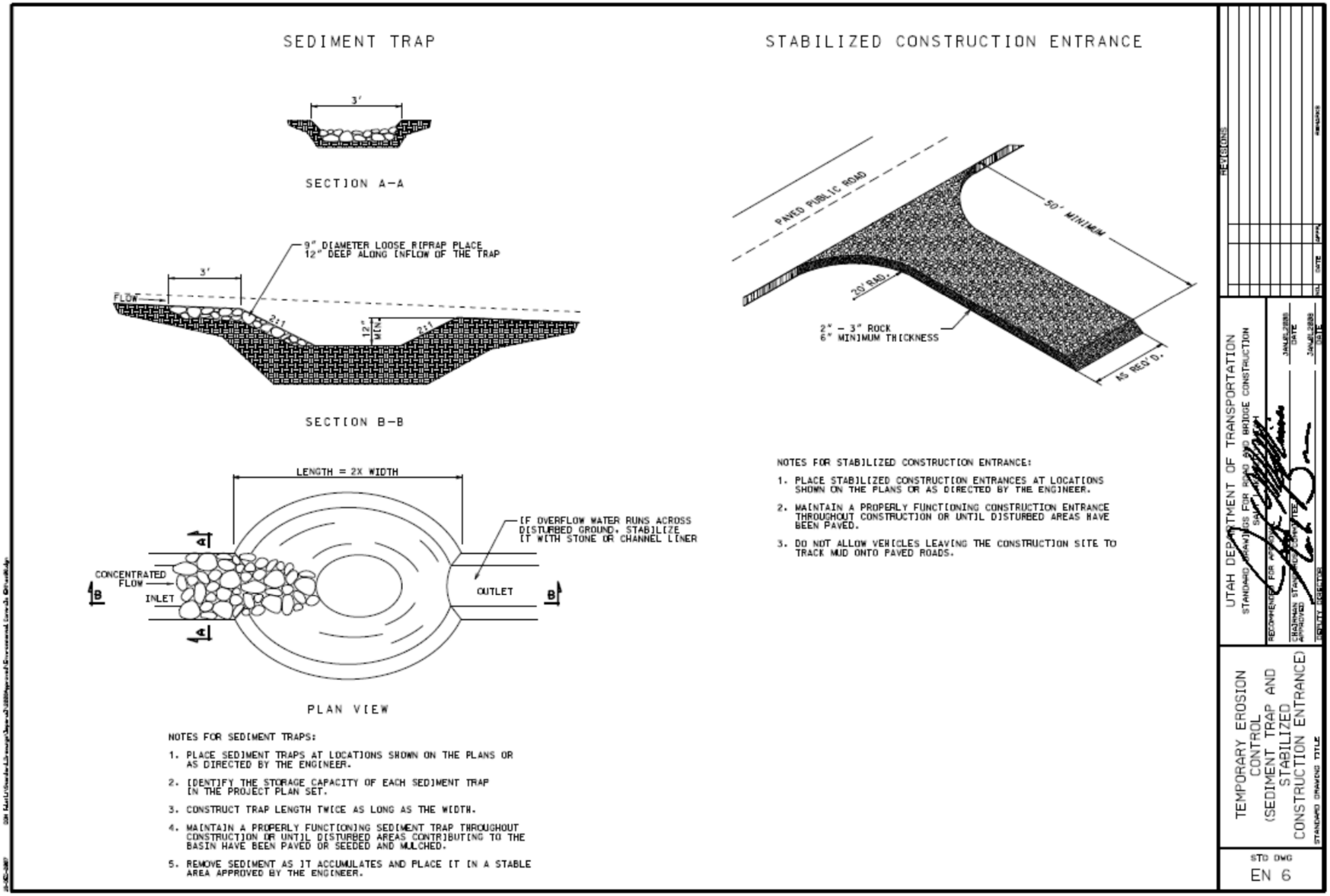
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

CATCH BASIN PROTECTION

10-26-92 EC-STR-19

Utah:


SEDIMENT TRAP
3'
SECTION A-A
9" DIAMETER LOOSE RIPRAP PLACE 12" DEEP ALONG INFLOW OF THE TRAP
3'
FLOW
2:1
12" MIN
2:1
SECTION B-B
LENGTH = 2X WIDTH
IF OVERFLOW WATER RUNS ACROSS DISTURBED GROUND, STABILIZE IT WITH STONE OR CHANNEL LINER
CONCENTRATED FLOW
INLET
OUTLET
A
B
PLAN VIEW
NOTES FOR SEDIMENT TRAPS:
1. PLACE SEDIMENT TRAPS AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. IDENTIFY THE STORAGE CAPACITY OF EACH SEDIMENT TRAP IN THE PROJECT PLAN SET.
3. CONSTRUCT TRAP LENGTH TWICE AS LONG AS THE WIDTH.
4. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT TRAP THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE BASIN HAVE BEEN PAVED OR SEEDED AND MULCHED.
5. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.
STABILIZED CONSTRUCTION ENTRANCE
PAVED PUBLIC ROAD
50' MINIMUM
20' RAD.
2" - 3" ROCK
6" MINIMUM THICKNESS
AS REQ'D.
NOTES FOR STABILIZED CONSTRUCTION ENTRANCE:
1. PLACE STABILIZED CONSTRUCTION ENTRANCES AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. MAINTAIN A PROPERLY FUNCTIONING CONSTRUCTION ENTRANCE THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS HAVE BEEN PAVED.
3. DO NOT ALLOW VEHICLES LEAVING THE CONSTRUCTION SITE TO TRACK MUD ONTO PAVED ROADS.
REVISIONS
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
TEMPORARY EROSION CONTROL (SEDIMENT TRAP AND STABILIZED CONSTRUCTION ENTRANCE)
STANDARD DRAWING TITLE
STD DWG
EN 6