CHATHAM COUNTY
NORTH CAROLINA

EROSION CONTROL PLAN REVIEW FOR LAND DEVELOPMENT

By: Justin Hasenfus, CPESC

WHY DO WE REVIEW PLANS?

Sedimentation Pollution Control Act:

Purpose: "…permit development of this State to continue with the least detrimental effects from pollution by sedimentation."

AGENDA

Part 1

- Responsibilities
- Requirements
- Tools
- Pointers

Part 2

- Application
- Design Standards*
- Miscellaneous

*Per the NCDEQ Erosion and Sediment Control Planning and Design Manual

PART 1

RESPONSIBILITIES

Compliance

- Plan must comply with applicable local, state, and federal laws and regulations
- Plan must not allow violation
- Plan must be legal

Judgement

- Best approximation with least erosion
- Feasible
- Practical
- Economical

Consider

- The design professional
- The regulating agencies
- The grading contractor
- Property owners
- The general public

REQUIREMENTS: WHAT DOES THE SPCA REQUIRE?

§ 113A-51.

- Preconstruction meeting (subject to staff availability)

§113A-56.(C)

- NCDEQ has concurrent jurisdiction with local programs

§ 113A-57.

- Require erosion control measures to retain sediment within boundaries of tract(s) of land to be disturbed
- Graded slope requirements
- Require permanent ground cover sufficient to restrain erosion

REQUIREMENTS: WHAT DOES THE SPCA REQUIRE?

§ 113A-60.

- Local government ordinance shall at least meet and may exceed the minimum requirements of SPCA
- Provisions for residential plans
- No erosion control measures required at high sides of project

REQUIREMENTS: WHAT DOES THE SPCA REQUIRE?

§ 113A-61.

- Review timeframe (15,30 day) →
- Approve, disapprove, or approve with modifications
- Grant conditional approval for environmental and other development approvals & permits
- Disapproval for buffer authorizations allowed
- Disapproval based on compliance record allowed
- Person submitting plan entitled to public hearing to appeal

Review Timeframe Guidance

PLAN REVIEWS

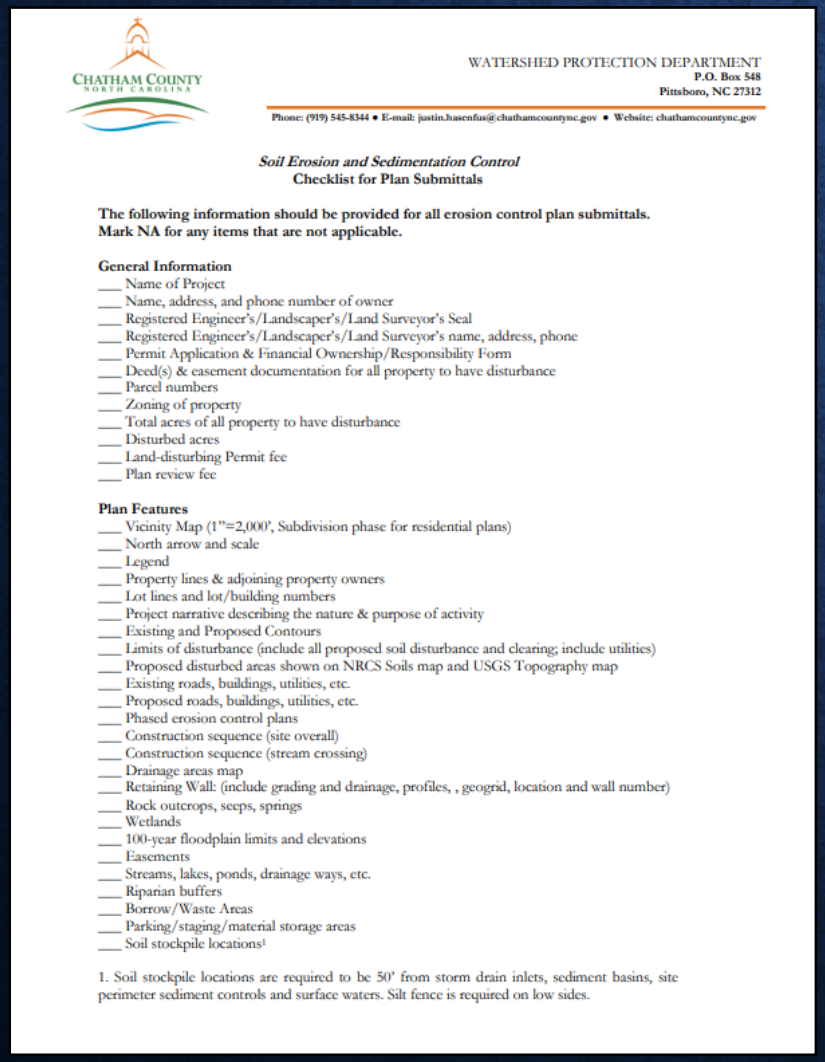
1. **Plans are to be reviewed and a decision rendered to the applicant within 30 calendar days of receipt of a complete plan**. Unlike with other permits, there is no pausing this "review clock". A complete plan is defined as follows:
    a. An erosion and sediment control plan
    b. Calculations in support of the design, if applicable
    c. An authorized statement of financial responsibility
    d. A letter of consent or permission letter from the landowner for the land-disturbance, if the landowner and the Financially Responsible Person/Party are not the same entity
    e. Documentation of property ownership (e.g., deed)
    f. Fees paid in full
2. **Plans are to be reviewed and a decision rendered to the applicant within 15 calendar days of receipt of a revised plan**. There is no pausing this "review clock" once it has started.

Reference: G.S. 113A-61(b)

TOOLS

- Local Ordinances
- Sedimentation Pollution Control Act
- NCDEQ Erosion & Sediment Control Planning and Design Manual
- Recorded Plats & Legal Instruments
- Reviewing Agencies
- Design Firm

TOOLS



CHATHAM COUNTY
NORTH CAROLINA

WATERSHED PROTECTION DEPARTMENT
P.O. Box 548
Pittsboro, NC 27312

Phone: (919) 545-8344 • E-mail: justin.hasenfus@chathamcountync.gov • Website: chathamcountync.gov

Soil Erosion and Sedimentation Control
Checklist for Plan Submittals

The following information should be provided for all erosion control plan submittals. Mark NA for any items that are not applicable.

General Information
___ Name of Project
___ Name, address, and phone number of owner
___ Registered Engineer's/Landscaper's/Land Surveyor's Seal
___ Registered Engineer's/Landscaper's/Land Surveyor's name, address, phone
___ Permit Application & Financial Ownership/Responsibility Form
___ Deed(s) & easement documentation for all property to have disturbance
___ Parcel numbers
___ Zoning of property
___ Total acres of all property to have disturbance
___ Disturbed acres
___ Land-disturbing Permit fee
___ Plan review fee

Plan Features
___ Vicinity Map (1"=2,000', Subdivision phase for residential plans)
___ North arrow and scale
___ Legend
___ Property lines & adjoining property owners
___ Lot lines and lot/building numbers
___ Project narrative describing the nature & purpose of activity
___ Existing and Proposed Contours
___ Limits of disturbance (include all proposed soil disturbance and clearing; include utilities)
___ Proposed disturbed areas shown on NRCS Soils map and USGS Topography map
___ Existing roads, buildings, utilities, etc.
___ Proposed roads, buildings, utilities, etc.
___ Phased erosion control plans
___ Construction sequence (site overall)
___ Construction sequence (stream crossing)
___ Drainage areas map
___ Retaining Wall: (include grading and drainage, profiles, , geogrid, location and wall number)
___ Rock outcrops, seeps, springs
___ Wetlands
___ 100-year floodplain limits and elevations
___ Easements
___ Streams, lakes, ponds, drainage ways, etc.
___ Riparian buffers
___ Borrow/Waste Areas
___ Parking/staging/material storage areas
___ Soil stockpile locations[1]

1. Soil stockpile locations are required to be 50' from storm drain inlets, sediment basins, site perimeter sediment controls and surface waters. Silt fence is required on low sides.

Erosion and Sediment Control Measures
___ Standard details for all measures
___ Construction entrance(s)
___ Silt fence (1/4 acre of drainage per 100 linear feet of silt fence, and not in concentrated flow)
___ Silt fence rock outlets
___ Temporary Diversion Ditches
___ Check Dams
___ Slope drains with inlet & outlet protection (primarily where slope drains enter basin)
___ Inlet Protection
___ Clean water conveyance(s) (where applicable)
___ Concrete Washouts[2]
___ Seed and sod specifications chart(s)
___ Skimmer basins (dimensions, volume, and surface area)
___ Size, type, and invert elevations for all storm sewer
___ Rock bench for skimmers
___ Ditch profiles with lining requirements & supporting calculations
___ Permanent liners in channels/ditch lines
___ Temporary liners in diversion ditches
___ Energy Dissipaters (sizes, dimensions, lining requirements & supporting calculations)
___ Label slopes greater than 3:1 and label required stabilization liner (e.g. SC150)
___ Temporary stream crossing details and sequence
___ Other proposed measures & necessary calculations

Other Requirements
___ Design calculations for culverts, storm sewers, and channels
___ Design calculations for sediment basins/traps
___ Fill in drainage easement (channel evaluation/design)
___ Stormwater plan (greater than 20,000 ft² disturbed), if applicable
___ Floodplain development permit, if applicable
___ Permit and flood study required (work in floodway), if applicable
___ Army Corp. of Engineers Section 404 Permit, if applicable
___ NCDEQ 401 Certification, if applicable
___ Chatham County/Pittsboro Planning
(Buffer authorizations, construction plan approval, etc.), if applicable
___ NCDOT permits and approvals, if applicable
___ NCG01 Ground Stabilization and Materials Handling Plan Sheet from NCDEQ webpage
(projects subject to NPDES)
___ NCG01 Inspection, Recordkeeping and Reporting Plan Sheet from NCDEQ webpage
(projects subject to NPDES)

NCDEQ's webpage with NCG01 updates:
https://deq.nc.gov/NCG01

Chatham County Erosion Control Standard Details:
https://www.chathamcountync.gov/government/departments-programs-i-z/watershed-protection/erosion-control/standard-details

Chatham County GIS:
https://chathamncgis.maps.arcgis.com/apps/webappviewer/index.html?id=65367d5f69774726828390a90c5cde1c

2. Concrete washouts are required to be 50' from storm drain inlets and surface waters.

TOOLS

NCG01 Permit Checklist (pages 7-9)

PART II – STORMWATER POLLUTION PREVENTION PLAN

The Stormwater Pollution Prevention Plan (SWPPP) for this permit shall include the approved **Erosion and Sedimentation Control (E&SC) Plan** as well as any requirements in this Part that exceed the approved E&SC Plan. Items that are required in the SWPPP but are not part of the approved E&SC Plan may include, at a minimum, Section E, Item (1) [*Ground Stabilization Timelines*], Section F [*Materials Handling*]. DEMLR provides two sample plan sheets that permittees may add to their E&SC Plan set to fulfill Sections E (1) and F of this permit at https://deq.nc.gov/NCG01. [*NCGS 113A– 57, 15A NCAC 04b .0107*]

Recommendations for preparing the E&SC plan as well as for designing, constructing, and maintaining the erosion and sedimentation control practices are contained in the North Carolina Erosion and Sediment Control Planning and Design Manual.

SECTION A: REQUIRED COMPONENTS OF THE EROSION AND SEDIMENTATION CONTROL PLAN

The E&SC Erosion and Sedimentation Control Plan shall include, at a minimum, the following components and **those components shall be in compliance with all conditions of this permit**. Hard and/or digital copies shall be submitted in accordance with the specifications of the E&SC plan authority. [*15A NCAC 04b .0107*]

1. Location Information

____ Project location & labeled vicinity map (roads, streets, landmarks)
____ North arrow and scale
____ Identification of the River Basin
____ A copy of site disturbed area located on applicable USGS quadrangle and hardbound copy of the NRCS Soils maps to scale
____ Latitude and longitude (in decimal degrees) at the project entrance

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

2. Narrative and Construction Sequence

____ Narrative describing the nature & purpose of the construction activity
____ Construction sequence related to erosion and sediment control (including installation of critical measures prior to the initiation of the land-disturbing activity & removal of measures after areas they serve are permanently stabilized). Address all phases of construction and necessary practices associated with temporary stream bypasses and/or crossings
____ Estimated start and end dates

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

3. General Site Features

____ Property lines
____ Existing and proposed contours (topographic lines)
____ Stockpiled topsoil or subsoil locations
____ Limits of disturbed area (with acreage labeled) within which all construction, material storage, grading, and related activities occur, including the following items as applicable:

- Access to E&SC measures, lots that will be disturbed, and utilities that may extend offsite.
- Temporary access and haul roads, other than public roads, constructed or used in connection with the land-disturbing activity
- Borrow and waste areas created by the applicant. If the land-disturbing activity and any related borrow or waste activity are not conducted by the same person, they shall be considered separate land-disturbing activities
- Offsite borrow pits if the borrow pit is a construction support activity to the development

____ Planned and existing building locations and elevations, if applicable
____ Planned & existing road locations & elevations, including temporary access roads, if applicable
____ Profiles of streets, utilities, and permanent ditch lines, if applicable
____ Lot lines and/or building numbers, if applicable
____ Easements and drainageways, particularly required for offsite affected areas, if applicable
____ Location and details associated with any onsite stone crushing or other processing of material excavated, if applicable. A mining permit will be required if the affected area associated with excavation, processing, stockpiles and transport of such materials comprises one or more acres, and materials will be leaving the development tract

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

4. Site Drainage Features

____ Existing and planned drainage patterns (include off-site areas that drain through project and address temporary and permanent conveyance of stormwater over graded slopes)
____ Drainage area map
____ Surface waters, including the limits of wetlands, streams, lakes and ponds and all required local or state buffer zones as well as impact maps by the construction activity to these sensitive areas.
____ Method used to determine acreage of land being disturbed and drainage areas to all proposed E&SC measures (e.g. delineation map)
____ Size, pipe material and location of culverts and sewers
____ Soil information throughout the site and below culvert storm outlets, including soil type and special characteristics
____ Name and classification of receiving water course where discharges are to occur

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

5. Plans Showing E&SC Measures

____ Legend (provide appropriate symbols for all measures and reference them to the construction details)
____ Location of temporary and permanent E&SC measures
____ Location of permanent stormwater quality and quantity control measures
____ Construction drawings and details for temporary and permanent measures, including outlet structures. Show measures to scale on plan and include proposed contours where necessary. Ensure design storage requirements are maintained through all phases of construction.
____ Specifications for ground stabilization
____ Maintenance requirements for measures
____ Contact person responsible for maintenance, if the permittee wishes to designate one. If not, the financially responsible organization will be the contact for maintenance.

____ A note stating that material handling procedures for the items required in Part II, Section F will be followed.
____ Standard details for structural BMPs to be installed to manage the anticipated materials listed in Part II, Section F such as construction debris management, concrete washout, paint washout, petroleum product storage and pesticide/herbicide handling, along with spill prevention practices.

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

6. Calculations

____ Calculations for peak discharges of runoff from each outlet at pre-development, during construction and at completion. Provide all supporting data for the computation methods used (rainfall data for required storm events, time of concentration/storm duration, and runoff coefficients).
____ Design calculations for culverts and storm sewers (include headwater, tailwater and outlet velocities)
____ Discharge and velocity calculations for open channel and ditch flows (easement & rights-of-way)
____ Design calculations for cross sections and method of stabilization for existing and planned channels (include temporary linings). Include appropriate permissible velocity and shear stress.
____ Design calculations and construction details for energy dissipaters below culvert and storm sewer outlets (include stone/material specs & apron dimensions). Avoid discharges on fill slopes.
____ Design calculations and dimensions for sediment traps and basins
____ Total and disturbed drainage areas for silt fencing and other sediment controls

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

7. Vegetative Stabilization Shown on Plans

____ Area & acreage to be stabilized with vegetation
____ Method of soil preparation
____ Seed type & rates (temporary & permanent)
____ Fertilizer type and rates
____ Mulch type and rates (include mulch anchoring methods)

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

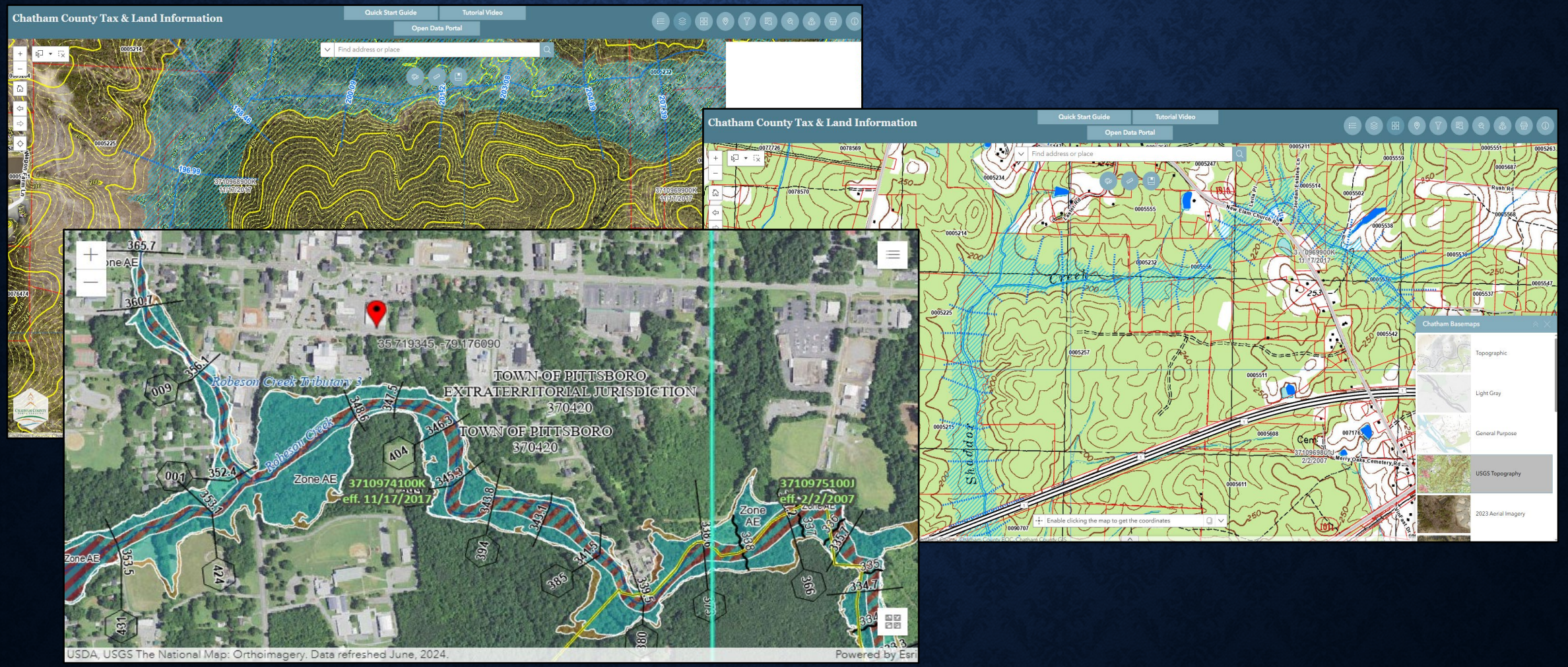
8. Documentation

____ Properly executed **Financial Responsibility/Ownership Form**
____ Certificate of assumed name, if the owner is a partnership
____ Name of Registered Agent (if applicable)
____ Copy of the most current Deed for the site. Please make sure the deed(s) and ownership information are consistent between the plan sheets, local records and this form.
____ Provide latitude & longitude (in decimal degrees) at the project entrance.
____ DWR Buffer Authorization, if required for project
____ Copies of any recorded easements and/or agreements with adjoining property owners for landlocked parcels

[*NCGS 113A– 57, 15A NCAC 04b .0107*]

CHATHAM COUNTY
NORTH CAROLINA

TOOLS



POINTERS

DO:

- Have hard copy/electronic files
- Allocate time appropriately
- Say what you mean and explain why
- Ask for more information
- Provide guidance where necessary
- Pick your battles
- Cite comments/Provide comment response
- Consider new measures or approaches

POINTERS

DON'T:

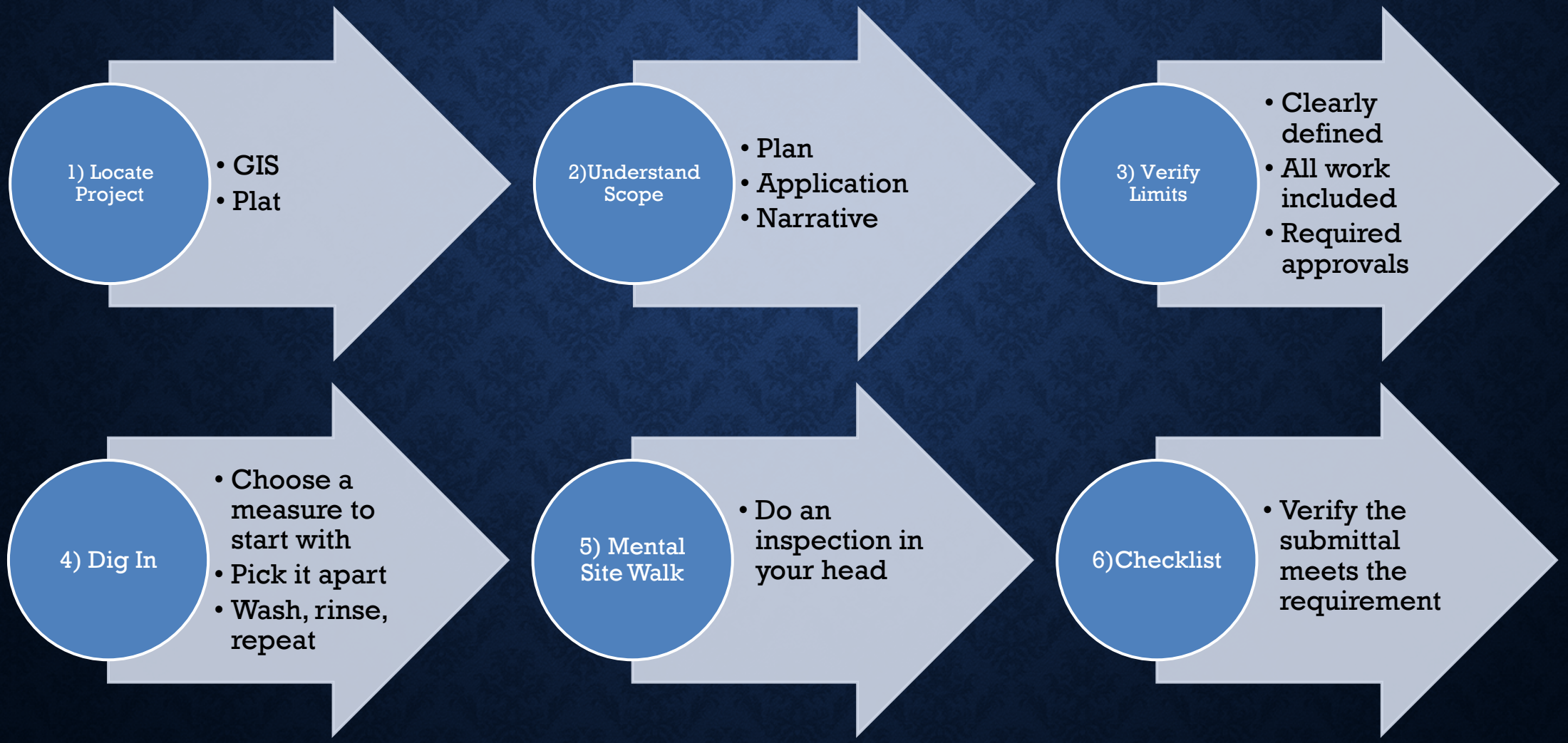
- Make large assumptions
- Skip reading ordinances or submittal requirements
- Forget to account for changes since last submittal
- Ever use measures in surface waters other than those that are allowed
- Get mad

POINTERS

IN GENERAL:

- Find a process that works
- Catch the big stuff
- Focus your time on what's most important
- Your goal is to produce a plan that is compliant and sufficient

POINTERS

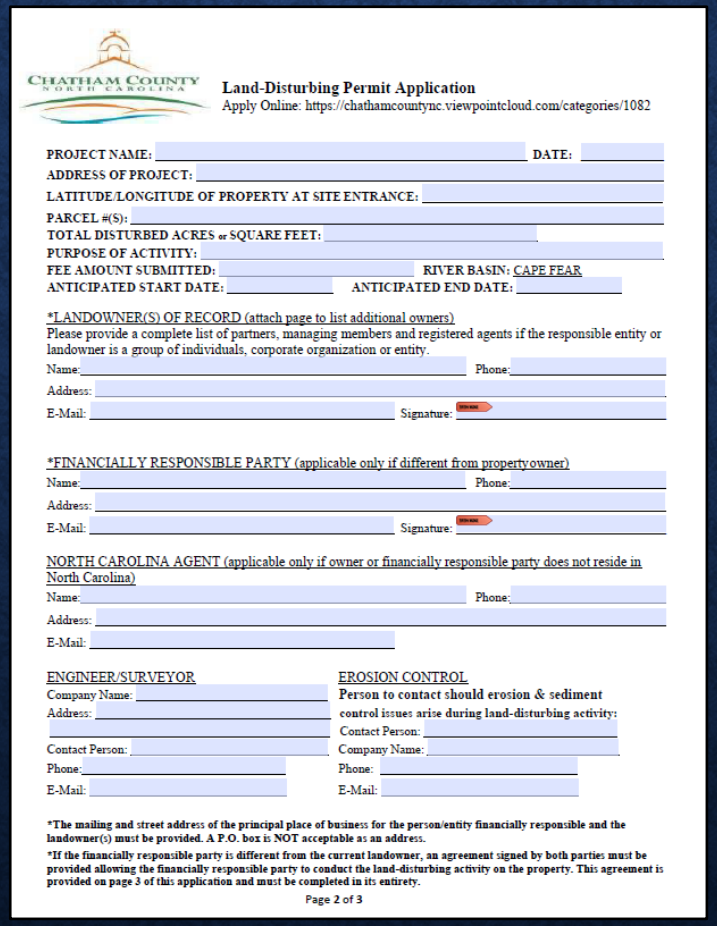

1) Locate Project
• GIS
• Plat
2)Understand Scope
• Plan
• Application
• Narrative
3) Verify Limits
• Clearly defined
• All work included
• Required approvals
4) Dig In
• Choose a measure to start with
• Pick it apart
• Wash, rinse, repeat
5) Mental Site Walk
• Do an inspection in your head
6)Checklist
• Verify the submittal meets the requirement

PART 2

APPLICATION

Check It

- All information present & correct
- NC Agent complete when required
- NC Secretary of State
- Authorized statement of financially responsibility & ownership
- Owner/FRP agreement



CHATHAM COUNTY
NORTH CAROLINA

Land-Disturbing Permit Application
Apply Online: https://chathamcountync.viewpointcloud.com/categories/1082

PROJECT NAME: _____ DATE: _____
ADDRESS OF PROJECT: _____
LATITUDE/LONGITUDE OF PROPERTY AT SITE ENTRANCE: _____
PARCEL #(S): _____
TOTAL DISTURBED ACRES or SQUARE FEET: _____
PURPOSE OF ACTIVITY: _____
FEE AMOUNT SUBMITTED: _____ RIVER BASIN: CAPE FEAR
ANTICIPATED START DATE: _____ ANTICIPATED END DATE: _____

*LANDOWNER(S) OF RECORD (attach page to list additional owners)
Please provide a complete list of partners, managing members and registered agents if the responsible entity or landowner is a group of individuals, corporate organization or entity.
Name: _____ Phone: _____
Address: _____
E-Mail: _____ Signature: _____

*FINANCIALLY RESPONSIBLE PARTY (applicable only if different from property owner)
Name: _____ Phone: _____
Address: _____
E-Mail: _____ Signature: _____

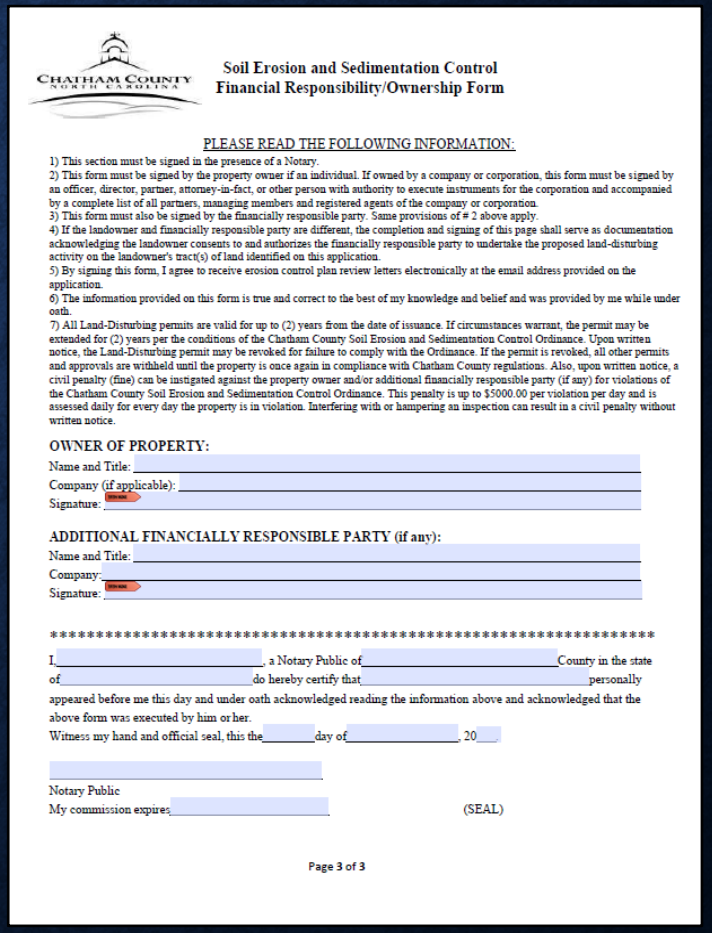
NORTH CAROLINA AGENT (applicable only if owner or financially responsible party does not reside in North Carolina)
Name: _____ Phone: _____
Address: _____
E-Mail: _____

ENGINEER/SURVEYOR
Company Name: _____
Address: _____
Contact Person: _____
Phone: _____
E-Mail: _____

EROSION CONTROL
Person to contact should erosion & sediment control issues arise during land-disturbing activity:
Contact Person: _____
Company Name: _____
Phone: _____
E-Mail: _____

*The mailing and street address of the principal place of business for the person/entity financially responsible and the landowner(s) must be provided. A P.O. box is NOT acceptable as an address.
*If the financially responsible party is different from the current landowner, an agreement signed by both parties must be provided allowing the financially responsible party to conduct the land-disturbing activity on the property. This agreement is provided on page 3 of this application and must be completed in its entirety.

Page 2 of 3



CHATHAM COUNTY
NORTH CAROLINA

Soil Erosion and Sedimentation Control
Financial Responsibility/Ownership Form

PLEASE READ THE FOLLOWING INFORMATION:

1) This section must be signed in the presence of a Notary.
2) This form must be signed by the property owner if an individual. If owned by a company or corporation, this form must be signed by an officer, director, partner, attorney-in-fact, or other person with authority to execute instruments for the corporation and accompanied by a complete list of all partners, managing members and registered agents of the company or corporation.
3) This form must also be signed by the financially responsible party. Same provisions of # 2 above apply.
4) If the landowner and financially responsible party are different, the completion and signing of this page shall serve as documentation acknowledging the landowner consents to and authorizes the financially responsible party to undertake the proposed land-disturbing activity on the landowner's tract(s) of land identified on this application.
5) By signing this form, I agree to receive erosion control plan review letters electronically at the email address provided on the application.
6) The information provided on this form is true and correct to the best of my knowledge and belief and was provided by me while under oath.
7) All Land-Disturbing permits are valid for up to (2) years from the date of issuance. If circumstances warrant, the permit may be extended for (2) years per the conditions of the Chatham County Soil Erosion and Sedimentation Control Ordinance. Upon written notice, the Land-Disturbing permit may be revoked for failure to comply with the Ordinance. If the permit is revoked, all other permits and approvals are withheld until the property is once again in compliance with Chatham County regulations. Also, upon written notice, a civil penalty (fine) can be instigated against the property owner and/or additional financially responsible party (if any) for violations of the Chatham County Soil Erosion and Sedimentation Control Ordinance. This penalty is up to $5000.00 per violation per day and is assessed daily for every day the property is in violation. Interfering with or hampering an inspection can result in a civil penalty without written notice.

OWNER OF PROPERTY:
Name and Title: _____
Company (if applicable): _____
Signature: _____

ADDITIONAL FINANCIALLY RESPONSIBLE PARTY (if any):
Name and Title: _____
Company: _____
Signature: _____

****

I, _____, a Notary Public of _____ County in the state of _____ do hereby certify that _____ personally appeared before me this day and under oath acknowledged reading the information above and acknowledged that the above form was executed by him or her.
Witness my hand and official seal, this the _____ day of _____, 20__

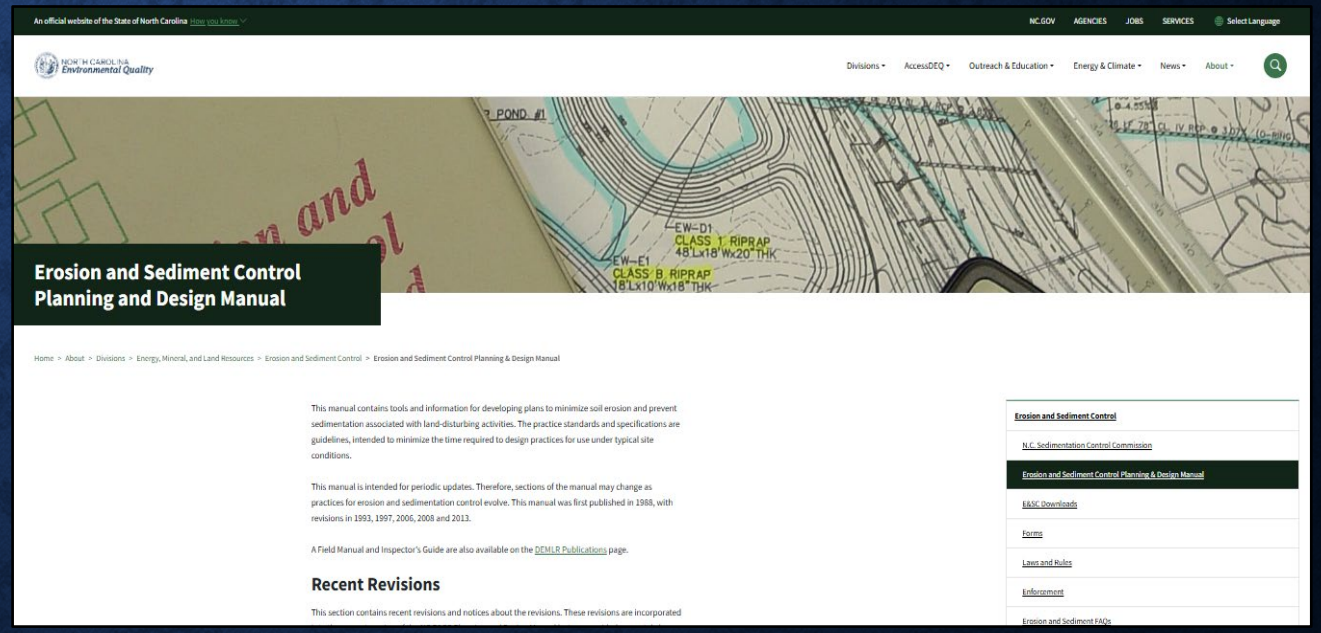
_____
Notary Public
My commission expires _____ (SEAL)

Page 3 of 3

DESIGN STANDARDS

Sources

- Local Ordinance
- NCDEQ Manual
- Other supported documents and practices of sound engineering



DESIGN STANDARDS

BASINS

Sediment Basin (Riser Basin)

Design Criteria	Summary:	Temporary Sediment Basin:
	Primary Spillway:	Riser/Barrel Pipe
	Maximum Drainage Area:	100 acres
	Minimum Sediment Storage Volume:	1800 cubic feet per acre of disturbed area
	Minimum Surface Area:	435 square feet per cfs of Q_{10} peak inflow
	Minimum L/W Ratio:	2:1
	Maximum L/W Ratio:	6:1
	Minimum Depth:	2 feet
	Dewatering Mechanism:	Skimmer(s) attached at bottom of riser pipe or flashboard riser
	Minimum Dewatering Time:	48 hours
	Baffles Required:	3 baffles* (*Note: Basins less than 20 feet in length may use 2 baffles.)

Sediment Skimmer Basin

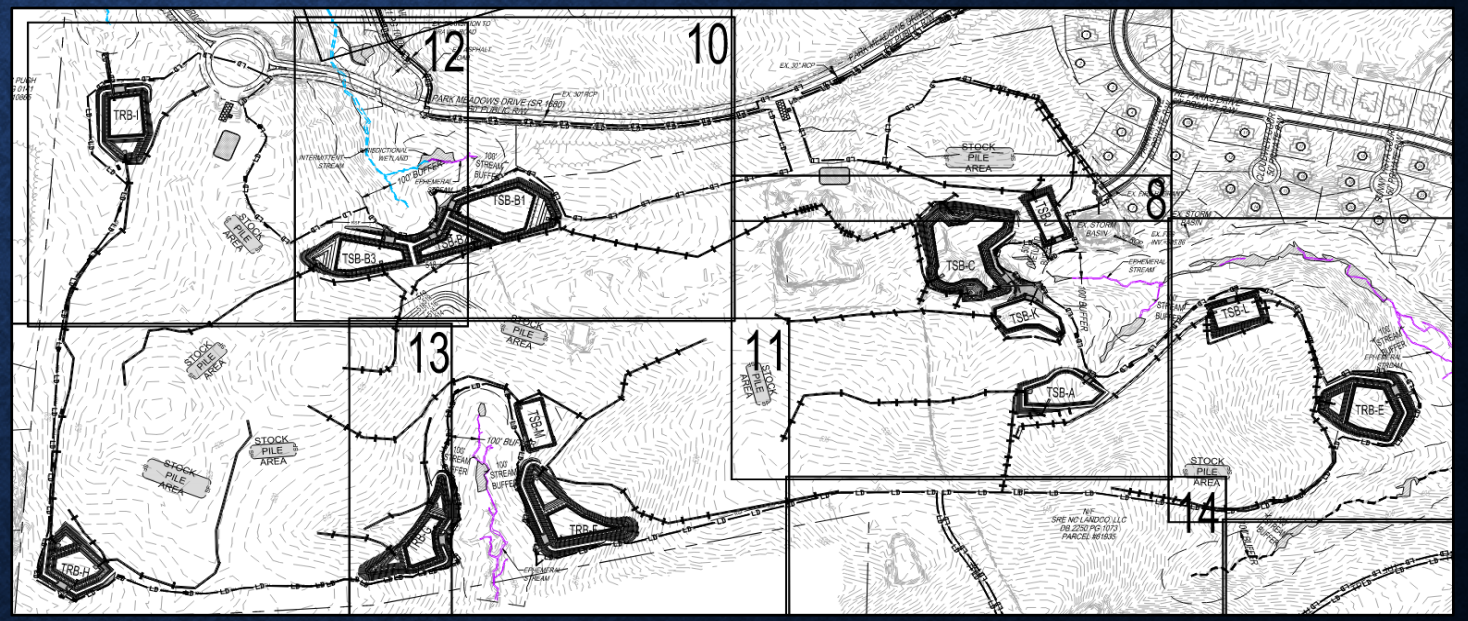
Design Criteria	Summary:	Skimmer Sediment Basin
	Primary Spillway:	Trapezoidal spillway with impermeable membrane
	Maximum Drainage Area:	10 acres
	Minimum Volume:	1800 cubic feet per acre of disturbed area
	Minimum Surface Area:	325 square feet per cfs of Q_{10} peak inflow
	Minimum L/W Ratio:	2:1
	Maximum L/W Ratio:	6:1
	Minimum Depth:	2 feet
	Dewatering Mechanism:	Skimmer
	Minimum Dewatering Time:	2 days
	Baffles Required:	3 baffles* (*Note: Basins less than 20 feet in length may use 2 baffles.)

DESIGN STANDARDS

BASINS

Location

- Locate in low areas
- Capture majority of disturbed area
- Interfere minimally w/construction
- Allows access for sediment removal
- Never locate in surface waters



DESIGN STANDARDS

BASINS

- Surface Area: "Shape of the container"

- Volume: "What's inside the container"

DESIGN STANDARDS

BASINS

Surface Area Required = Q x 435*
Q = CIA
Q = peak rate of runoff (cfs)
C = runoff coefficient
I = avg. intensity of rainfall (in/hr)
A = drainage area (acres)
*Skimmer Basin: Minimum 325 sq.ft./cfs of Q_{10} peak inflow
*Riser Basin = Minimum 435 sq.ft./cfs of Q_{10} peak inflow

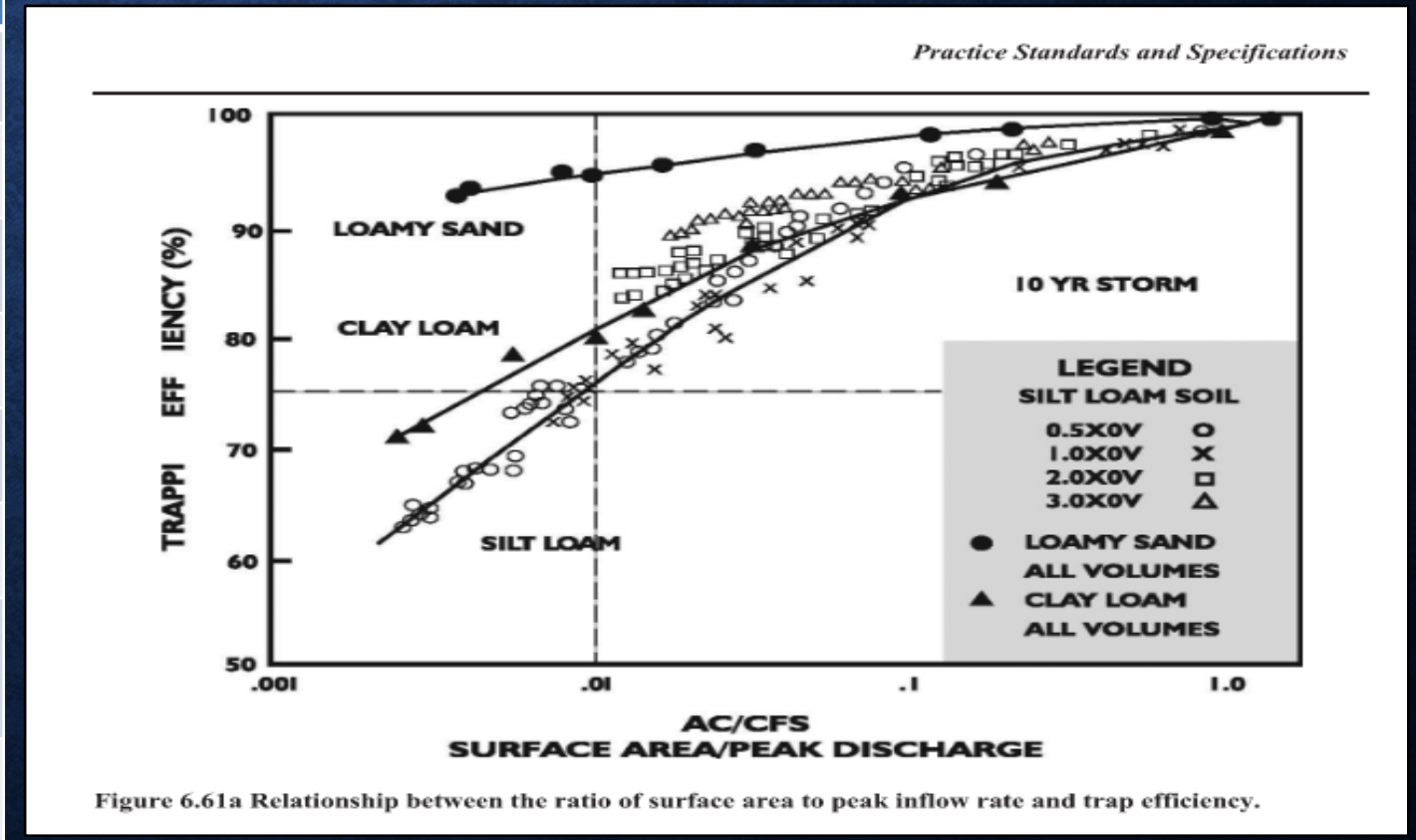


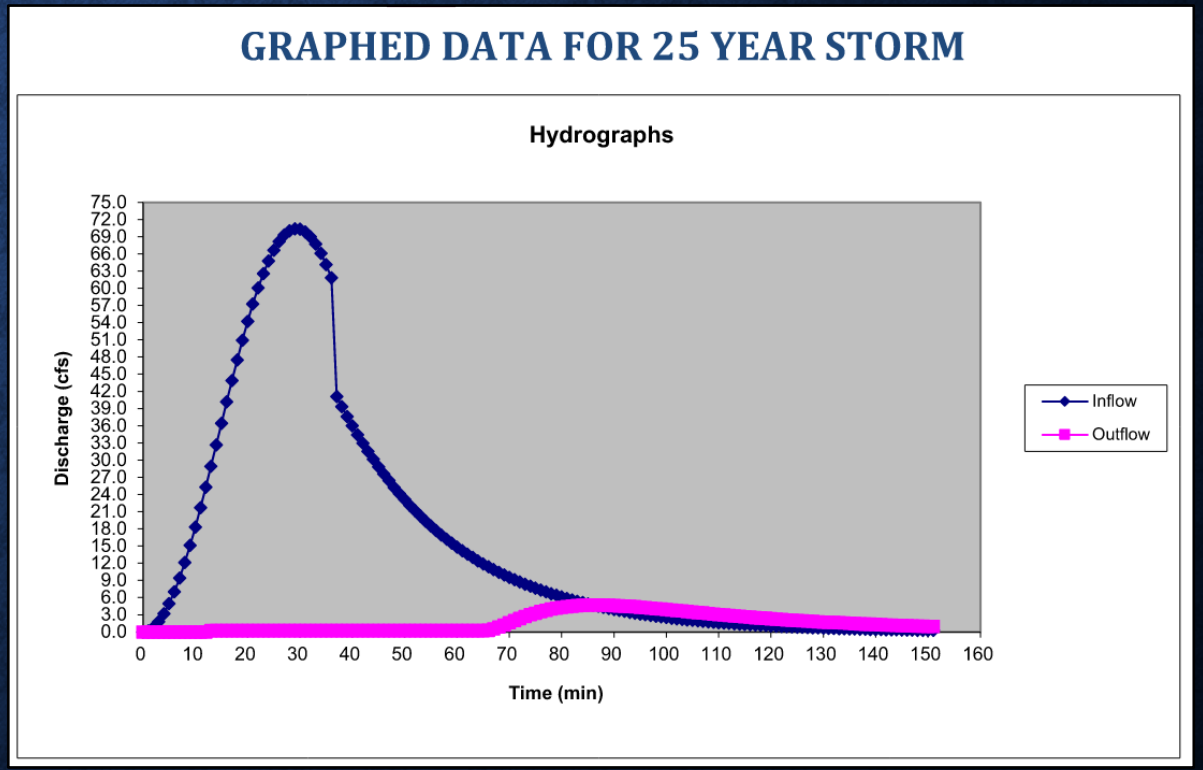
Figure 6.61a Relationship between the ratio of surface area to peak inflow rate and trap efficiency.

DESIGN STANDARDS

BASINS

Peak rate of runoff (Q)

- Maximum rate of water flow passing a specific point for the design storm
- Calculated using:
  - Rational method or
  - NRCS method
- Rational method is Q = CIA and primarily used for drainage area < 50 acres
- NRCS more accurate for areas > 20 acres



DESIGN STANDARDS

BASINS

Runoff coefficient (C)

- Relationship between rainfall rate and runoff rate
- Determined by soil type/land cover in the drainage area
- Table of values in DEQ manual or ordinance
- Land use and soil cover homogenous in drainage area = use C value from table
- Land use and soil cover NOT homogenous, a weighted C value is calculated

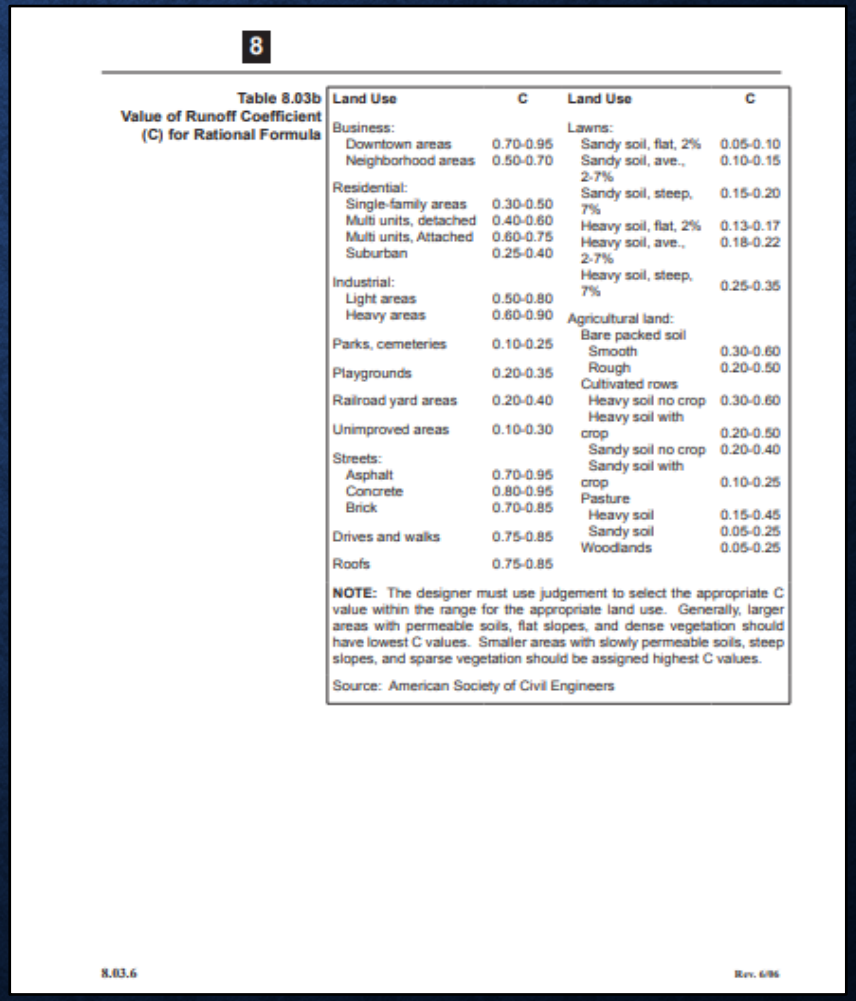


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Table 8.03b
Value of Runoff Coefficient (C) for Rational Formula

Land Use	C	Land Use	C
Business:		Lawns:	
Downtown areas	0.70-0.95	Sandy soil, flat, 2%	0.05-0.10
Neighborhood areas	0.50-0.70	Sandy soil, ave., 2-7%	0.10-0.15
Residential:		Sandy soil, steep, 7%	0.15-0.20
Single-family areas	0.30-0.50	Heavy soil, flat, 2%	0.13-0.17
Multi units, detached	0.40-0.60	Heavy soil, ave., 2-7%	0.18-0.22
Multi units, Attached	0.60-0.75	Heavy soil, steep, 7%	0.25-0.35
Suburban	0.25-0.40		
Industrial:		Agricultural land:	
Light areas	0.50-0.80	Bare packed soil	
Heavy areas	0.60-0.90	Smooth	0.30-0.60
Parks, cemeteries	0.10-0.25	Rough	0.20-0.50
		Cultivated rows	
Playgrounds	0.20-0.35	Heavy soil no crop	0.30-0.60
		Heavy soil with crop	0.20-0.50
Railroad yard areas	0.20-0.40	Sandy soil no crop	0.20-0.40
		Sandy soil with crop	0.10-0.25
Unimproved areas	0.10-0.30	Pasture	
		Heavy soil	0.15-0.45
Streets:		Sandy soil	0.05-0.25
Asphalt	0.70-0.95	Woodlands	0.05-0.25
Concrete	0.80-0.95		
Brick	0.70-0.85		
Drives and walks	0.75-0.85		
Roofs	0.75-0.85		

NOTE: The designer must use judgement to select the appropriate C value within the range for the appropriate land use. Generally, larger areas with permeable soils, flat slopes, and dense vegetation should have lowest C values. Smaller areas with slowly permeable soils, steep slopes, and sparse vegetation should be assigned highest C values.

Source: American Society of Civil Engineers

8.03.6

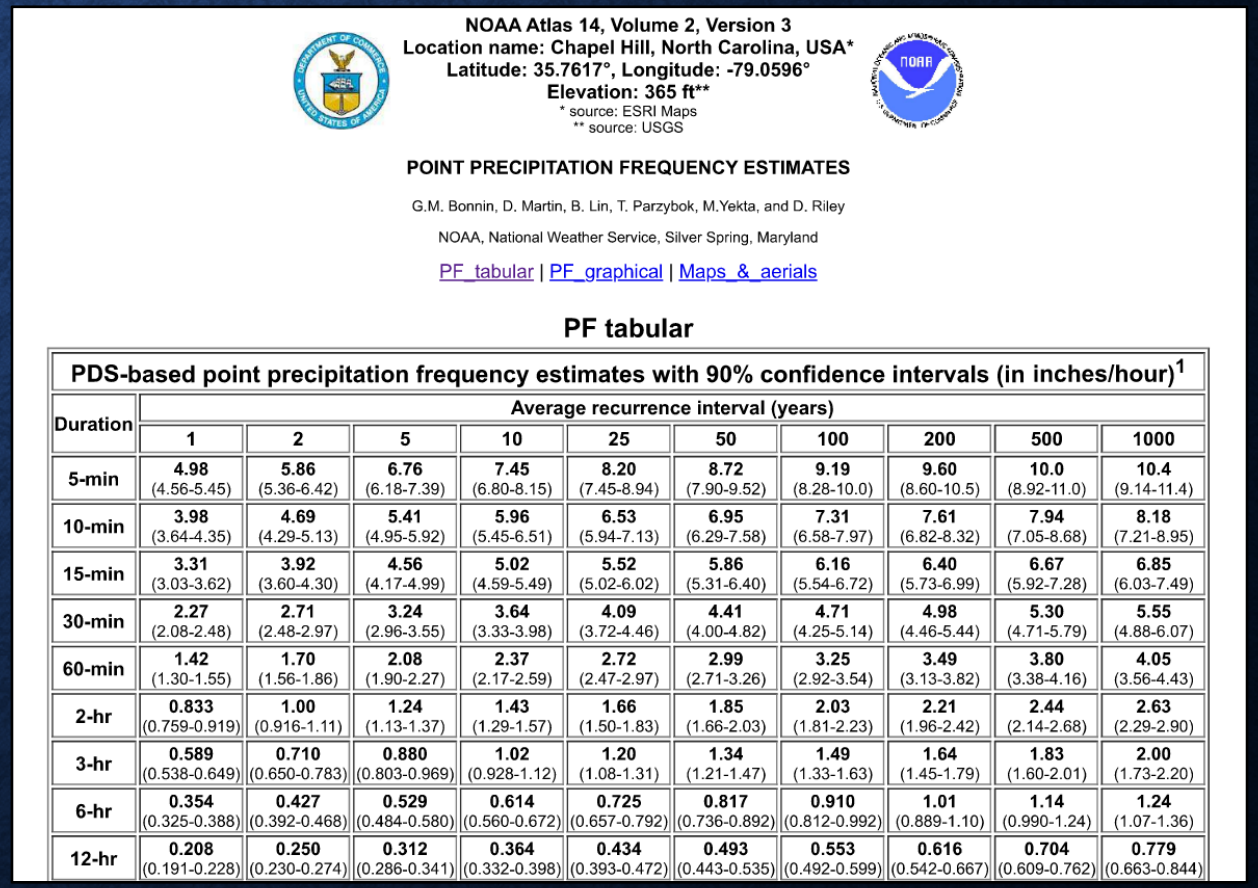
Rev. 6/06

DESIGN STANDARDS

BASINS

Rainfall Intensity (I)

- Minimum design storm = 10 year
- Average intensity (in/hr) for storm duration equal to time of concentration
- Time of concentration calculation should be provided
- Data source included with submittal



NOAA Atlas 14, Volume 2, Version 3
Location name: Chapel Hill, North Carolina, USA*
Latitude: 35.7617°, Longitude: -79.0596°
Elevation: 365 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.98 (4.56-5.45)	5.86 (5.36-6.42)	6.76 (6.18-7.39)	7.45 (6.80-8.15)	8.20 (7.45-8.94)	8.72 (7.90-9.52)	9.19 (8.28-10.0)	9.60 (8.60-10.5)	10.0 (8.92-11.0)	10.4 (9.14-11.4)
10-min	3.98 (3.64-4.35)	4.69 (4.29-5.13)	5.41 (4.95-5.92)	5.96 (5.45-6.51)	6.53 (5.94-7.13)	6.95 (6.29-7.58)	7.31 (6.58-7.97)	7.61 (6.82-8.32)	7.94 (7.05-8.68)	8.18 (7.21-8.95)
15-min	3.31 (3.03-3.62)	3.92 (3.60-4.30)	4.56 (4.17-4.99)	5.02 (4.59-5.49)	5.52 (5.02-6.02)	5.86 (5.31-6.40)	6.16 (5.54-6.72)	6.40 (5.73-6.99)	6.67 (5.92-7.28)	6.85 (6.03-7.49)
30-min	2.27 (2.08-2.48)	2.71 (2.48-2.97)	3.24 (2.96-3.55)	3.64 (3.33-3.98)	4.09 (3.72-4.46)	4.41 (4.00-4.82)	4.71 (4.25-5.14)	4.98 (4.46-5.44)	5.30 (4.71-5.79)	5.55 (4.88-6.07)
60-min	1.42 (1.30-1.55)	1.70 (1.56-1.86)	2.08 (1.90-2.27)	2.37 (2.17-2.59)	2.72 (2.47-2.97)	2.99 (2.71-3.26)	3.25 (2.92-3.54)	3.49 (3.13-3.82)	3.80 (3.38-4.16)	4.05 (3.56-4.43)
2-hr	0.833 (0.759-0.919)	1.00 (0.916-1.11)	1.24 (1.13-1.37)	1.43 (1.29-1.57)	1.66 (1.50-1.83)	1.85 (1.66-2.03)	2.03 (1.81-2.23)	2.21 (1.96-2.42)	2.44 (2.14-2.68)	2.63 (2.29-2.90)
3-hr	0.589 (0.538-0.649)	0.710 (0.650-0.783)	0.880 (0.803-0.969)	1.02 (0.928-1.12)	1.20 (1.08-1.31)	1.34 (1.21-1.47)	1.49 (1.33-1.63)	1.64 (1.45-1.79)	1.83 (1.60-2.01)	2.00 (1.73-2.20)
6-hr	0.354 (0.325-0.388)	0.427 (0.392-0.468)	0.529 (0.484-0.580)	0.614 (0.560-0.672)	0.725 (0.657-0.792)	0.817 (0.736-0.892)	0.910 (0.812-0.992)	1.01 (0.889-1.10)	1.14 (0.990-1.24)	1.24 (1.07-1.36)
12-hr	0.208 (0.191-0.228)	0.250 (0.230-0.274)	0.312 (0.286-0.341)	0.364 (0.332-0.398)	0.434 (0.393-0.472)	0.493 (0.443-0.535)	0.553 (0.492-0.599)	0.616 (0.542-0.667)	0.704 (0.609-0.762)	0.779 (0.663-0.844)

DESIGN STANDARDS

BASINS

Volume Required	1800 cf/disturbed acre
Volume Recommended	1800 cf/drainage acre

Volume:

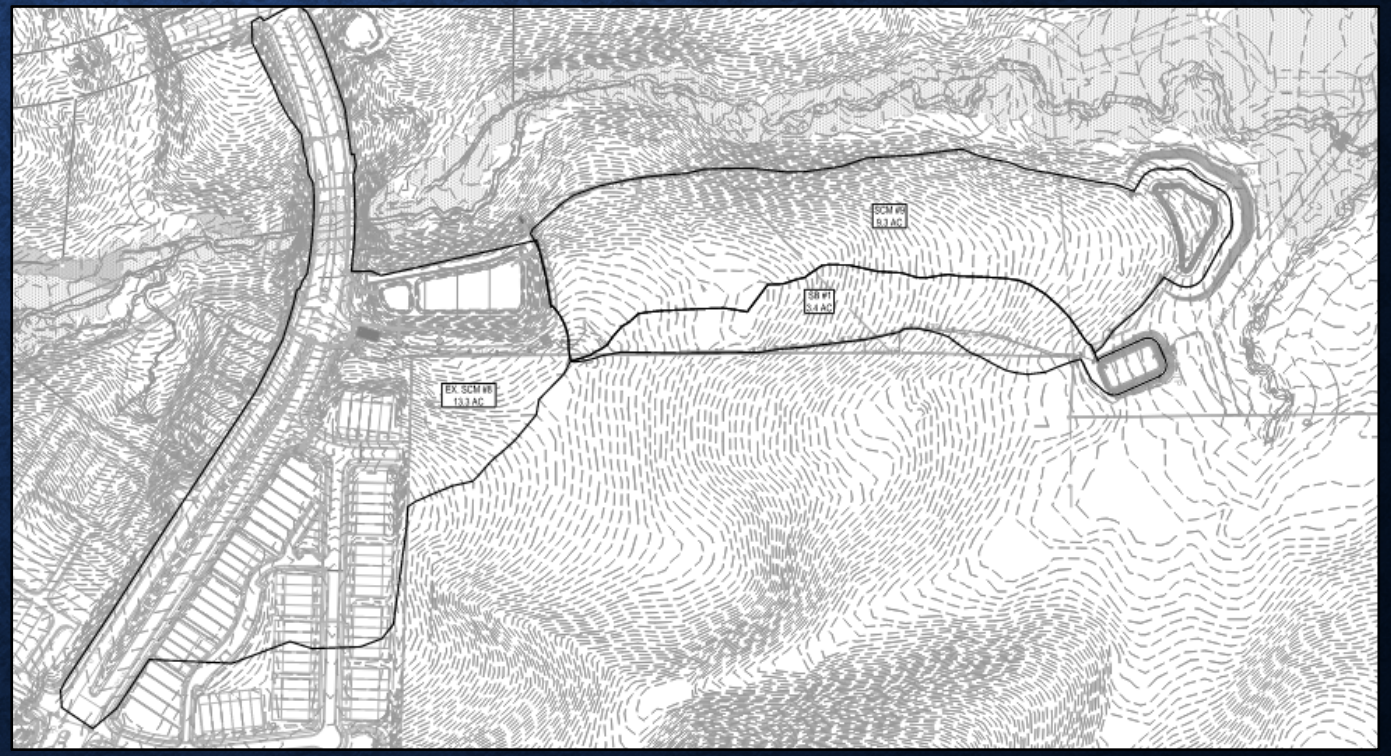
- Measured to the elevation of crest of principal spillway:
  - Riser basin = top of riser
  - Skimmer basin = emergency spillway

DESIGN STANDARDS

BASINS

Drainage Area (A)

- Map included to confirm inputs
- Drainage area in acres
- Must include all drainage that would drain to basin

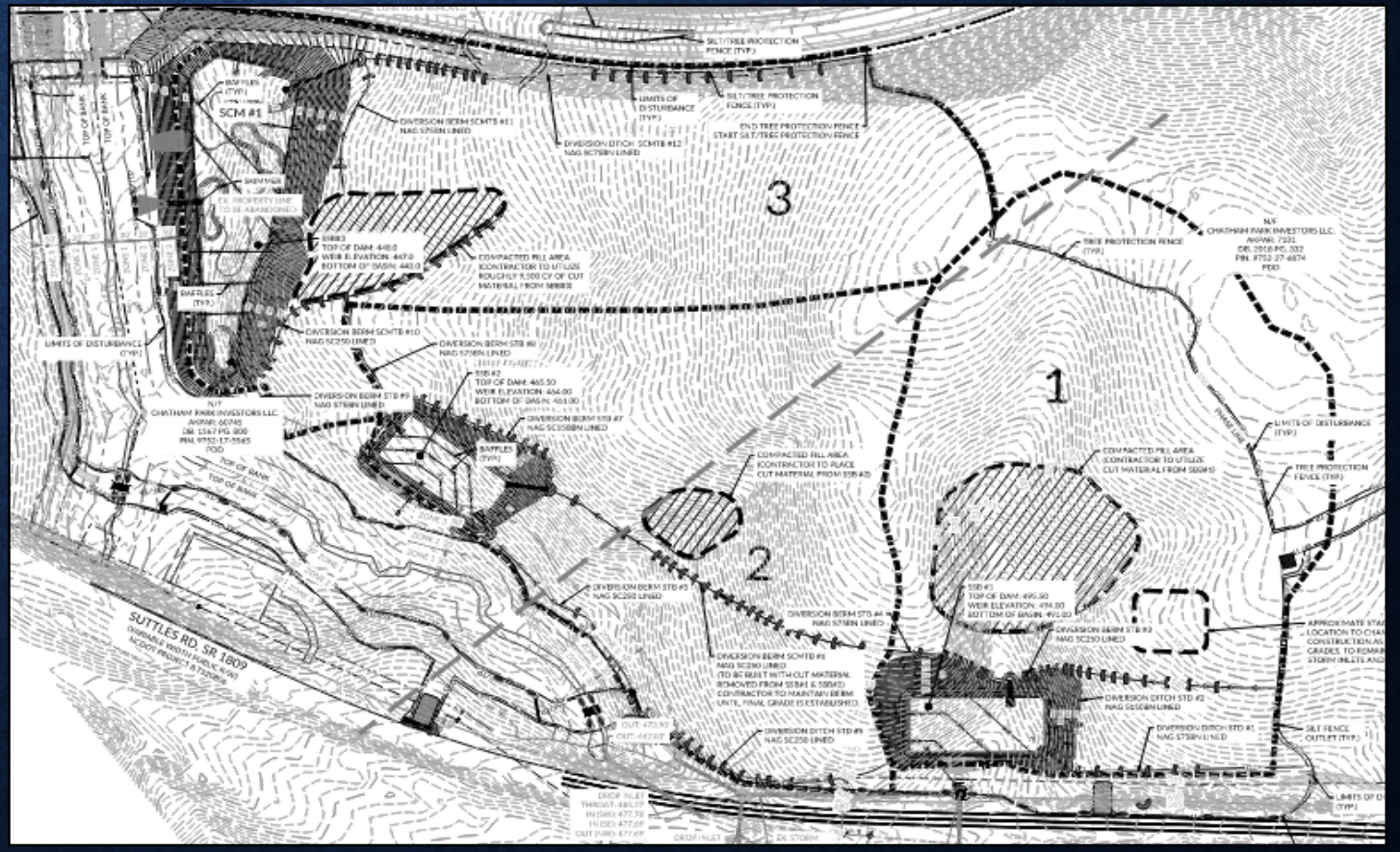


DESIGN STANDARDS

BASINS

Drainage Maps Include:

- Drainage values
- Contours
- Limits of disturbance
- Measures analyzed



CHATHAM COUNTY
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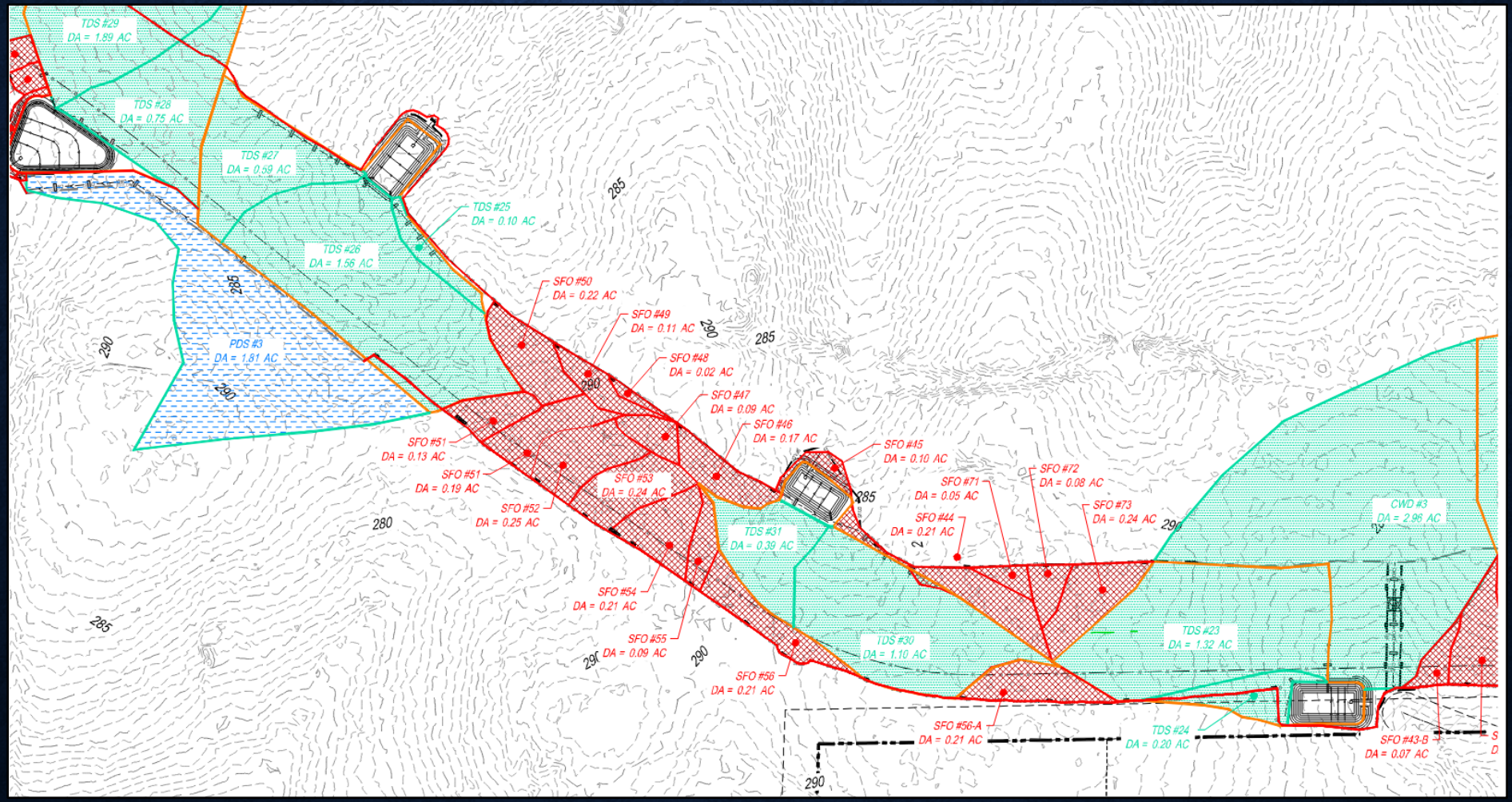
DESIGN STANDARDS

BASINS



Drainage Maps for silt fence outlets to confirm all are < 0.25 acres / 100 LF silt fence outside basin drainage.

DESIGN STANDARDS

BASINS

TEMPORARY SKIMMER BASIN & ORIFICE DIAMETER CALCULATIONS

BASIN	TYPE	DRAINAGE AREA	DISTURBED AREA	C VALUE	PEAK FLOW	DEPTH	LENGTH	WIDTH	WEIR LENGTH	VOLUME REQUIRED	VOLUME PROVIDED	SURFACE AREA REQUIRED	SURFACE AREA PROVIDED	SKIMMER SIZE	ORIFICE SIZE	Dewatering Time
		(AC)	(AC)		(CFS)	(FT)	(FT)	(FT)	(FT)	(CF)	(CF)	(SF)	(SF)	(IN)	(IN)	(DAYS)
SSB #1	SKIMMER	9.99	9.99	0.50	41.26	4.5	SEE EC PLANS		38	35,964	42,517	17,948	19,014	4.0	3.25	3.02
SSB #2	SKIMMER	8.87	8.87	0.50	36.63	4.5	SEE EC PLANS		34	31,932	36,939	15,935	16,319	4.0	3	3.08
SSB #3	SKIMMER	9.97	9.97	0.50	41.18	4.0	SEE EC PLANS		38	35,892	97,108	17,912	51,871	5.0	4.5	3.22

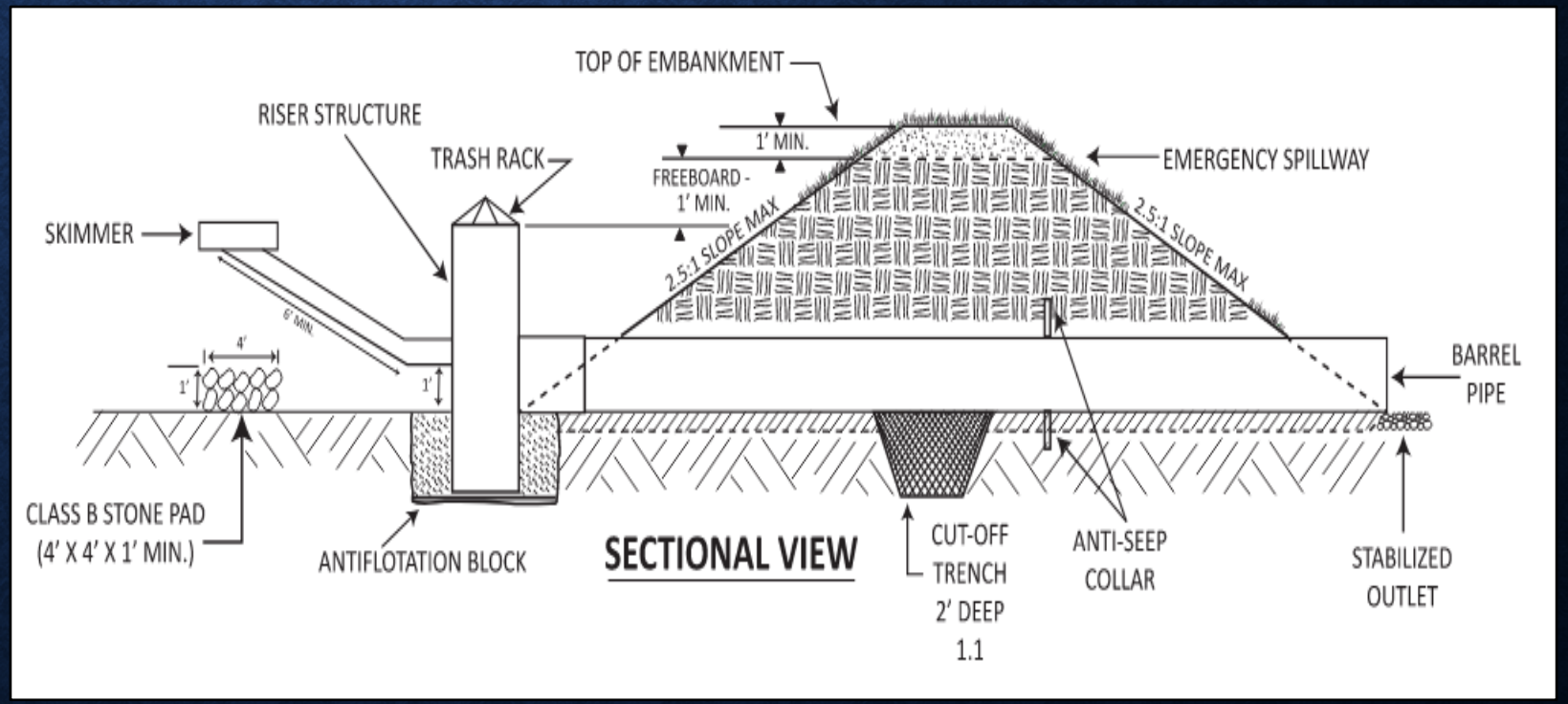
- The reviewer can ask for clear representation of design information
- This table should be in the plan or information otherwise called out

DESIGN STANDARDS

RISER BASINS

Risers:

- Design minimum 2-yr
- Riser profiles provided
- Protect against piping:
  - Watertight anti-seep collar
  - Filter diaphragm
- Protect against flotation
  - Anti-flotation block
- Cut-off trench

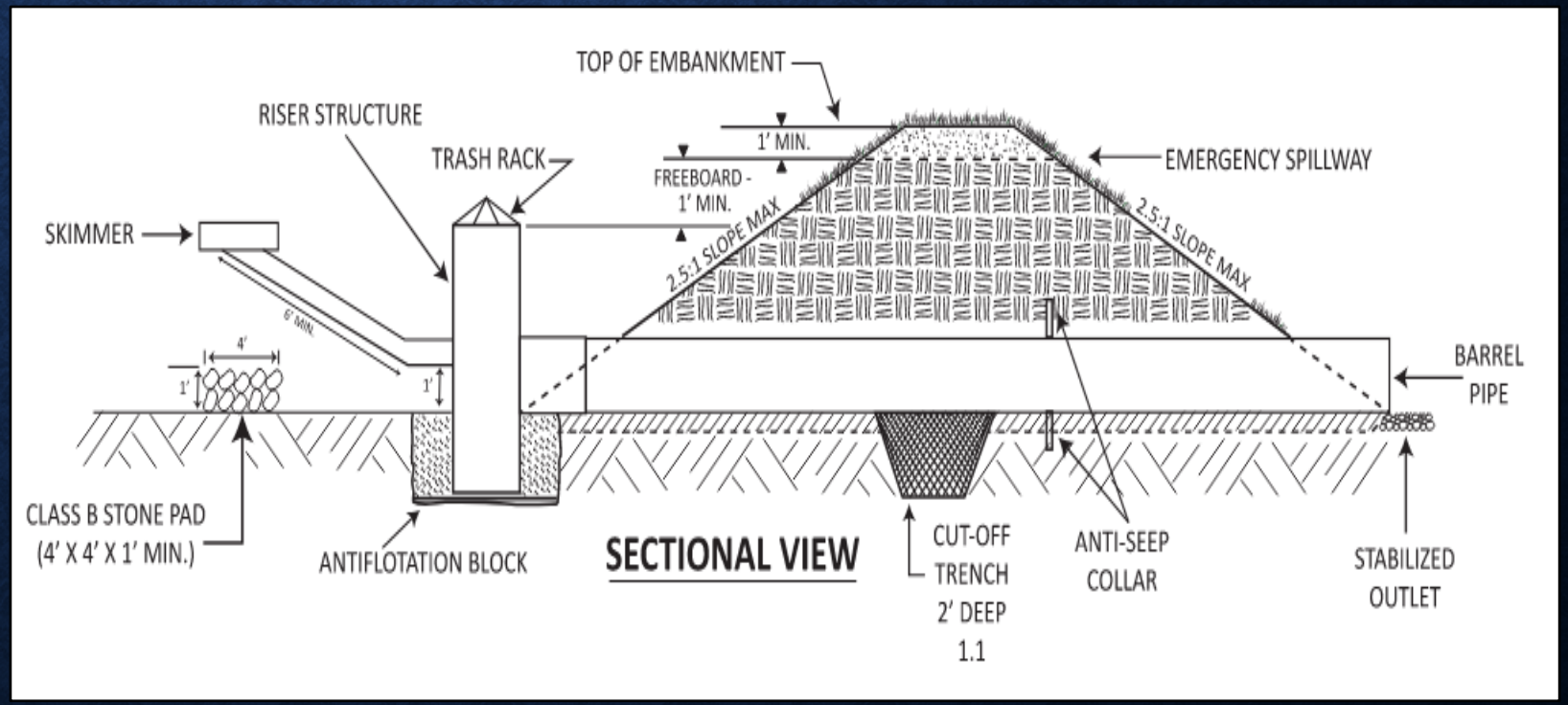


DESIGN STANDARDS

RISER BASINS

Embankment:

- Riser crest 1 ft. below emergency spillway crest
- Max Dam Height: 15 feet
- Top width:
  - Fill height < 10 ft = 8.0 ft
  - Fill height 10-15 ft = 10.0 ft
- Sideslopes 2.5:1 or flatter

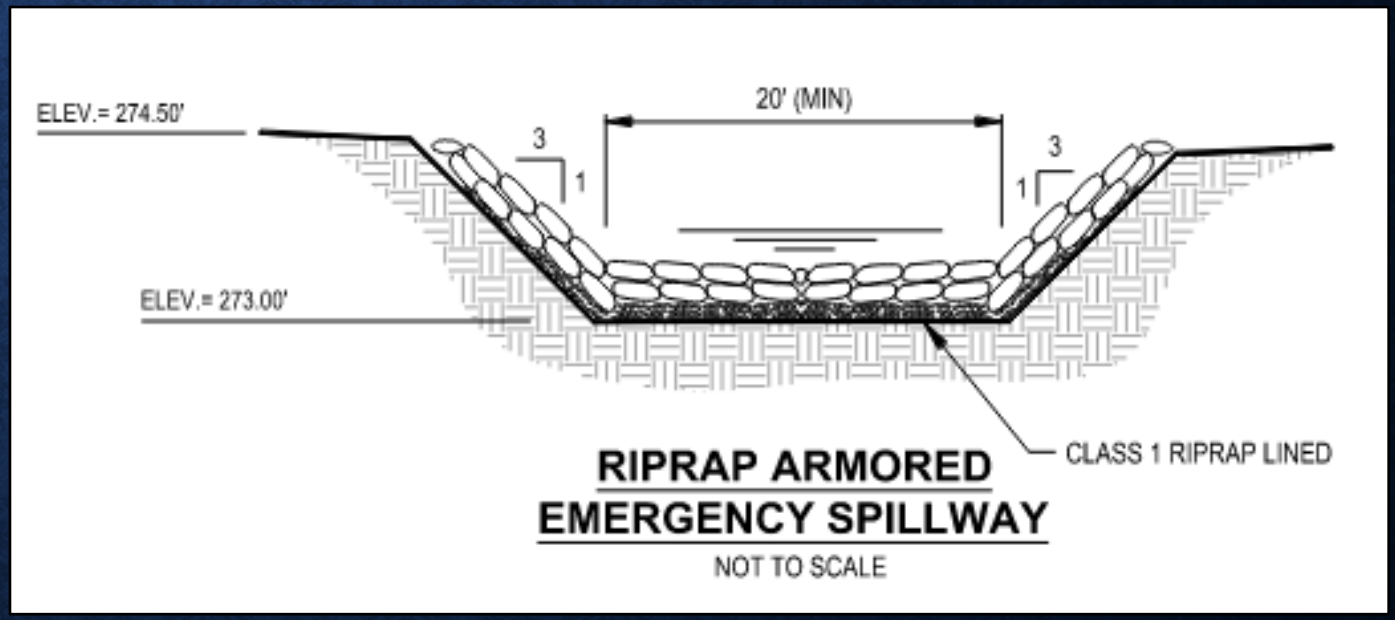


DESIGN STANDARDS

RISER BASINS

Emergency Spillway:

- Design minimum 10-yr
- Minimum 1 foot of freeboard
- Trapezoidal, sideslopes 3:1 or flatter
- Control section straight and at least 20 ft wide



DESIGN STANDARDS

RISER BASINS

Emergency Spillway:

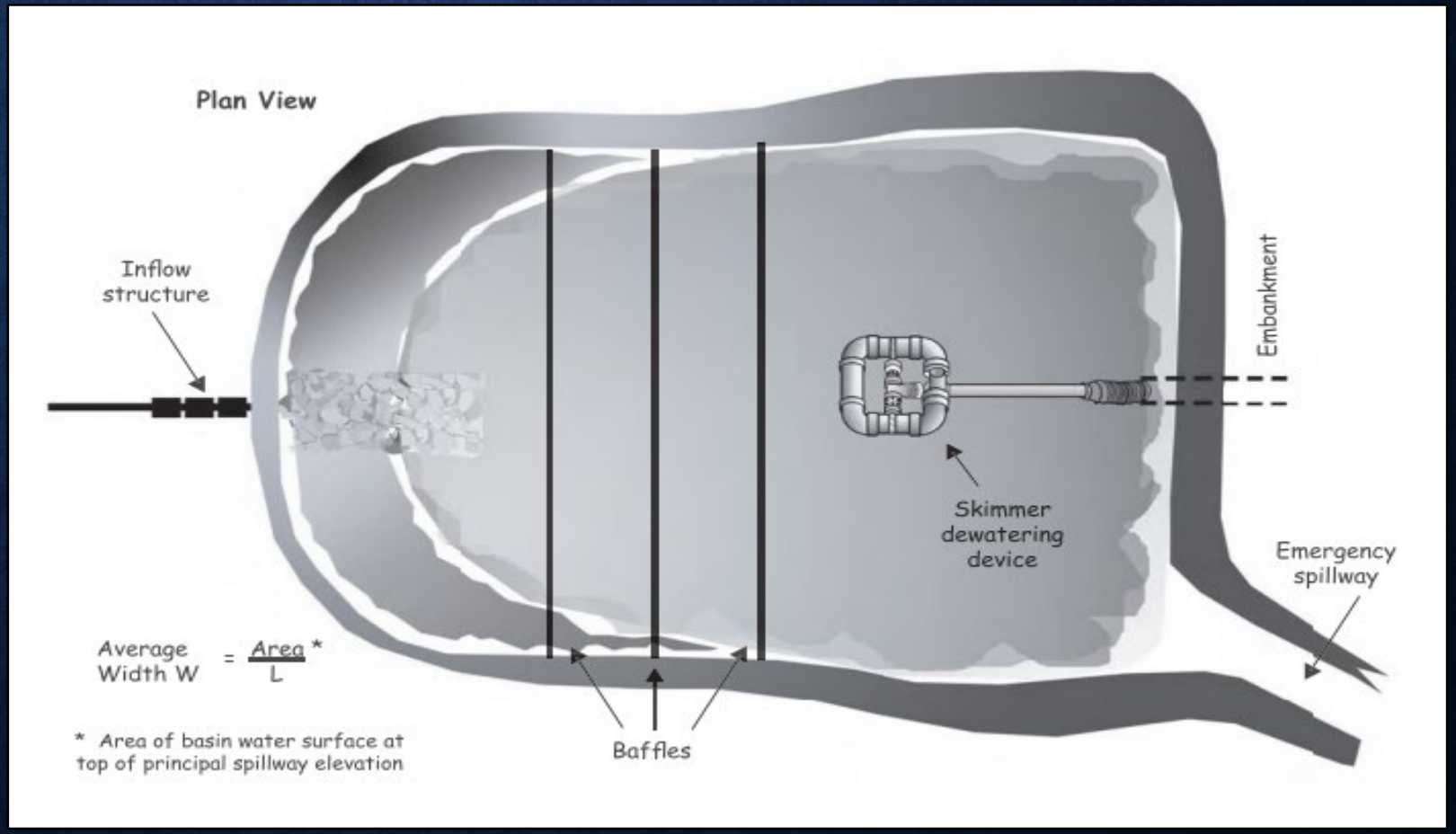
- Stabilized appropriately
- Velocity of flow discharged non-erosive

DESIGN STANDARDS

SKIMMER BASINS

<u>Embankment:</u>

- Max Dam Height: 5 feet
- Top width: 5 feet
- Sideslopes 2:1 or flatter



DESIGN STANDARDS

SKIMMER BASINS

Emergency Spillway:

- Same as riser basin
- Max depth of flow 6" from design storm elevation to spillway invert
- Designed length

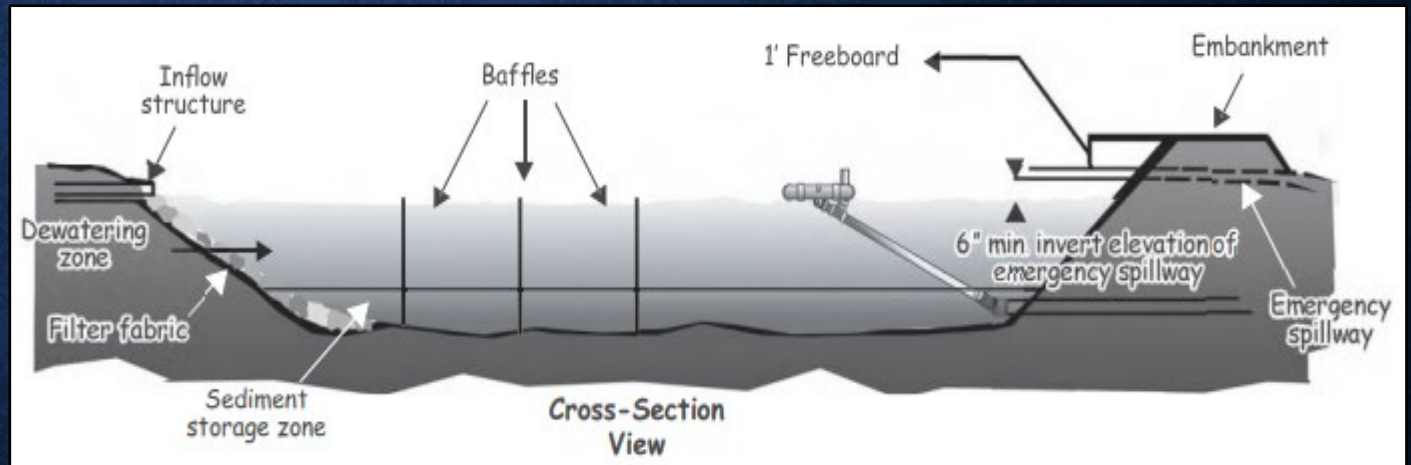


Figure 6.64c Example of a sediment basin with a skimmer outlet and emergency spillway. From Pennsylvania Erosion and Sediment Pollution Control Manual, March, 2000.

DESIGN STANDARDS

ALL BASINS

Embankment:

- Stabilized:
  - Temporary < 1 year
  - Permanent ≥ 1 year

DESIGN STANDARDS

ALL BASINS

Skimmer:

- Attached to base of riser or through bottom of dam for skimmer basins
- Sized appropriately
- Dewater in 2-5 days

DESIGN STANDARDS

ALL BASINS

Skimmer:

- Schedule 40 PVC barrel
- Sit on rip rap pad to prevent sticking
- Retrieval rope

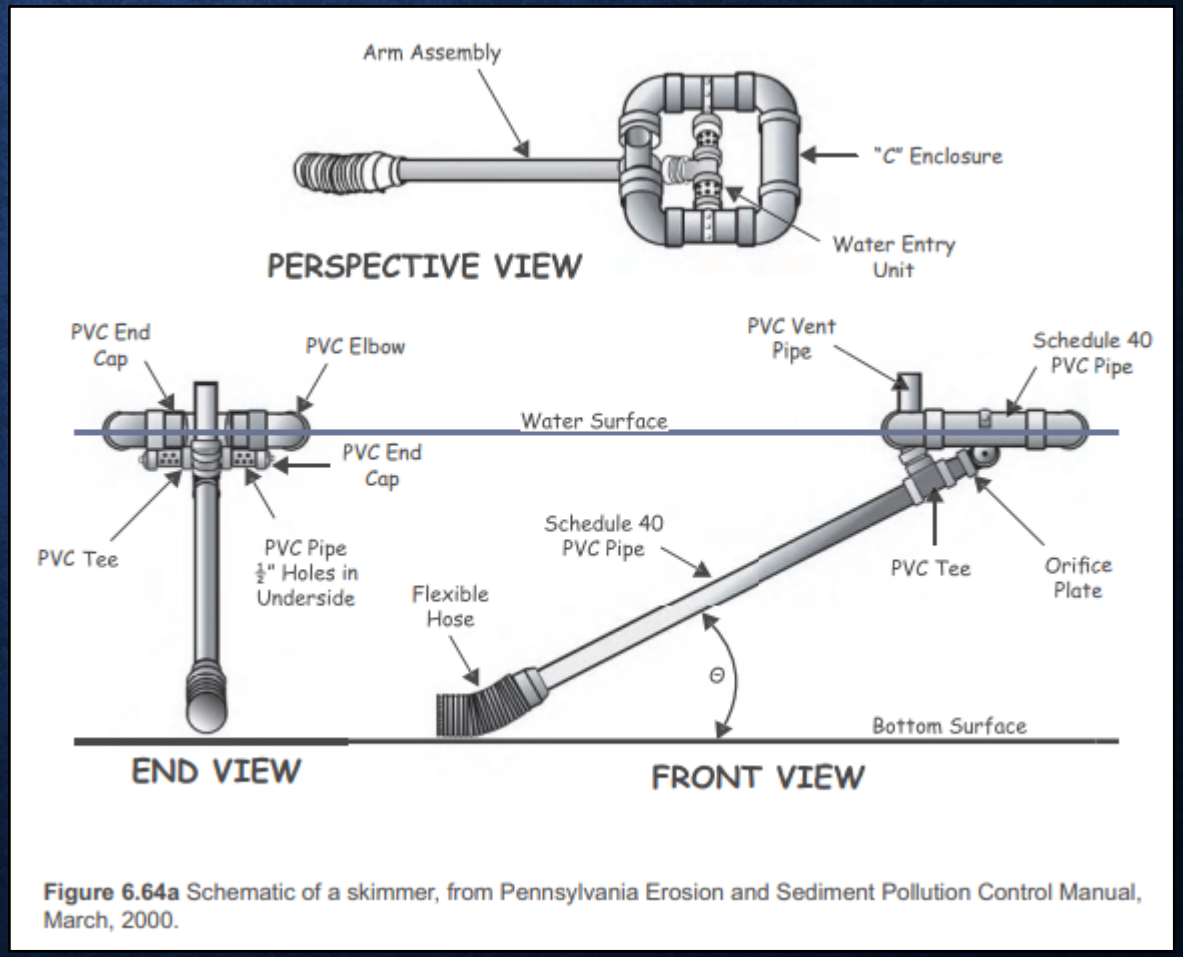


Figure 6.64a Schematic of a skimmer, from Pennsylvania Erosion and Sediment Pollution Control Manual, March, 2000.

DESIGN STANDARDS

ALL BASINS

Baffles:

- Minimum (3) porous baffles unless basin < 20 ft
- Separate basin to even cells
- Purpose is to spread out flow and utilize surface area
- Should not be located directly at basin inlet

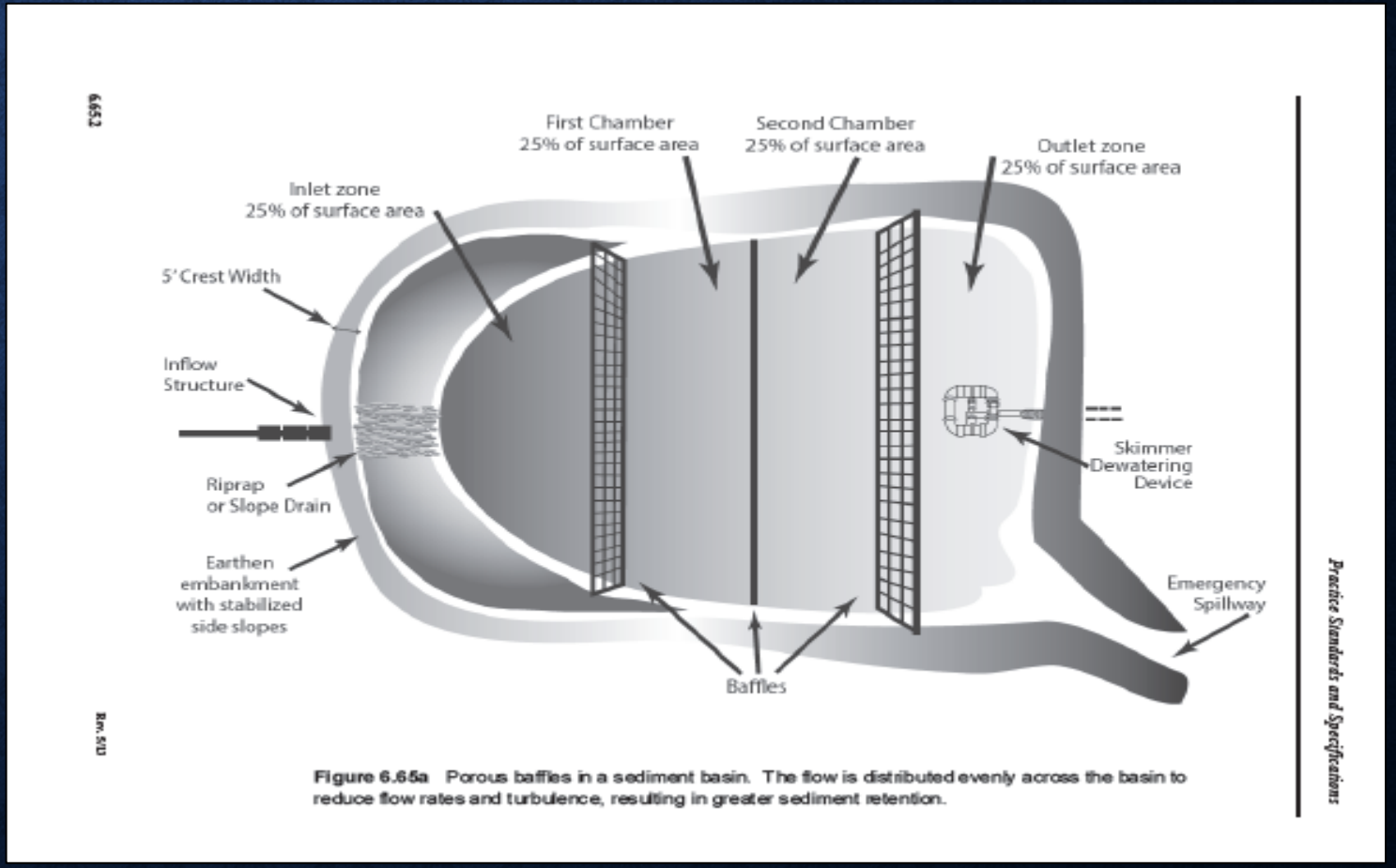


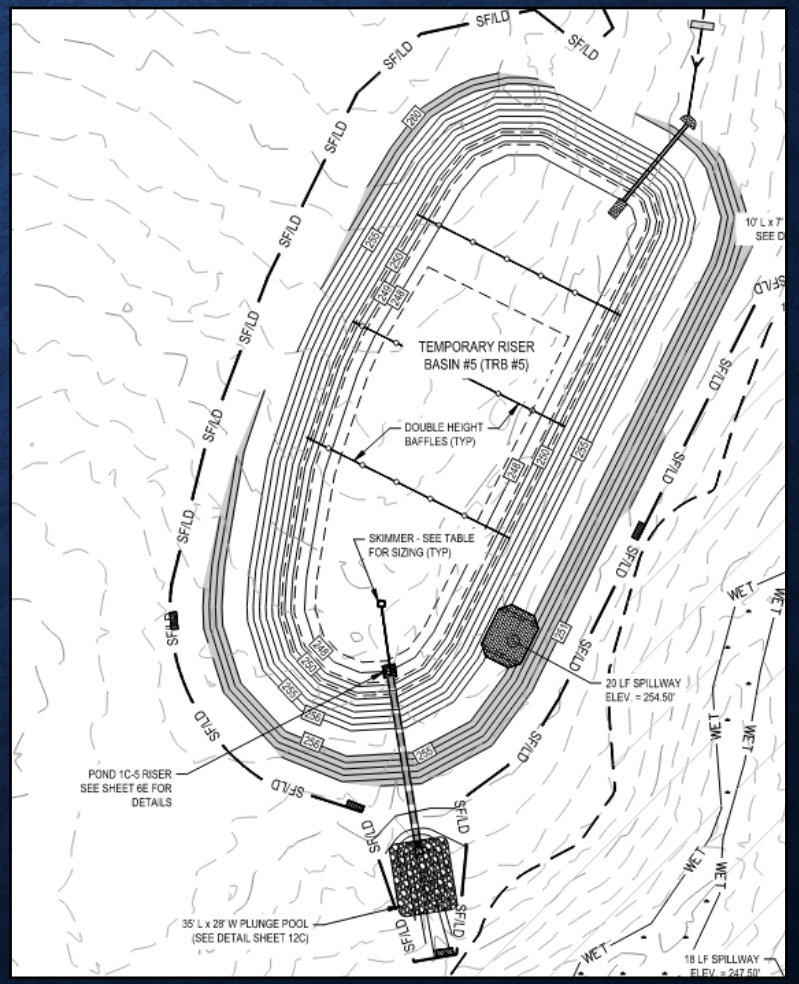
Figure 6.65a Porous baffles in a sediment basin. The flow is distributed evenly across the basin to reduce flow rates and turbulence, resulting in greater sediment retention.

DESIGN STANDARDS

ALL BASINS

Baffles:

- Top of baffle fabric 6” higher than invert of spillway
- Top of baffle 2” lower than top of dam
- If temporary basin will be converted to permanent stormwater basin of greater depth, baffle height based on pool depth during use as temporary basin
- Increase in baffle height may be necessary



CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

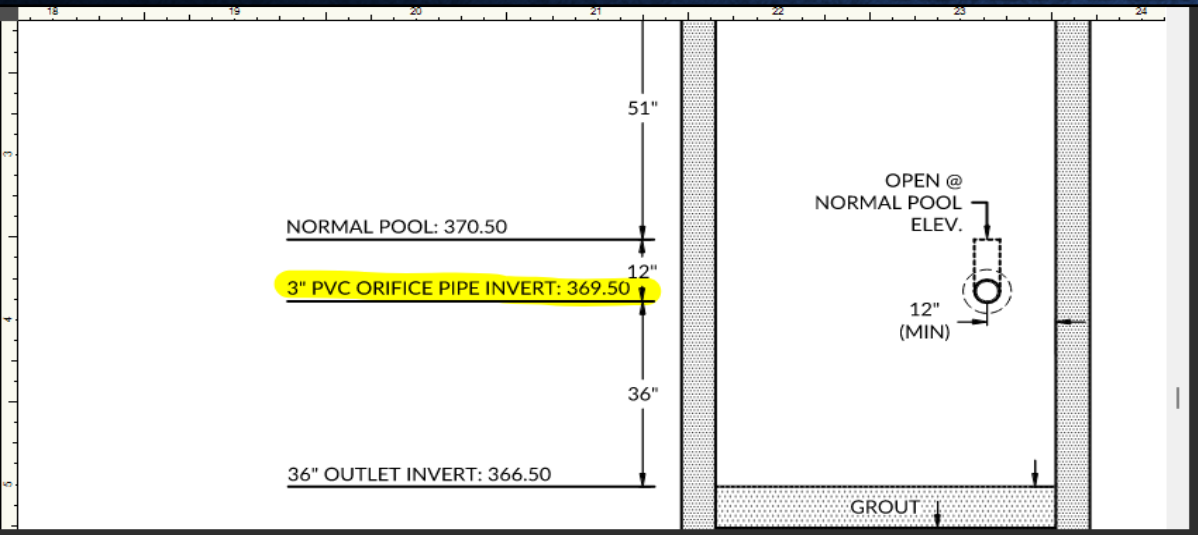
ALL BASINS

Single height baffles ✓

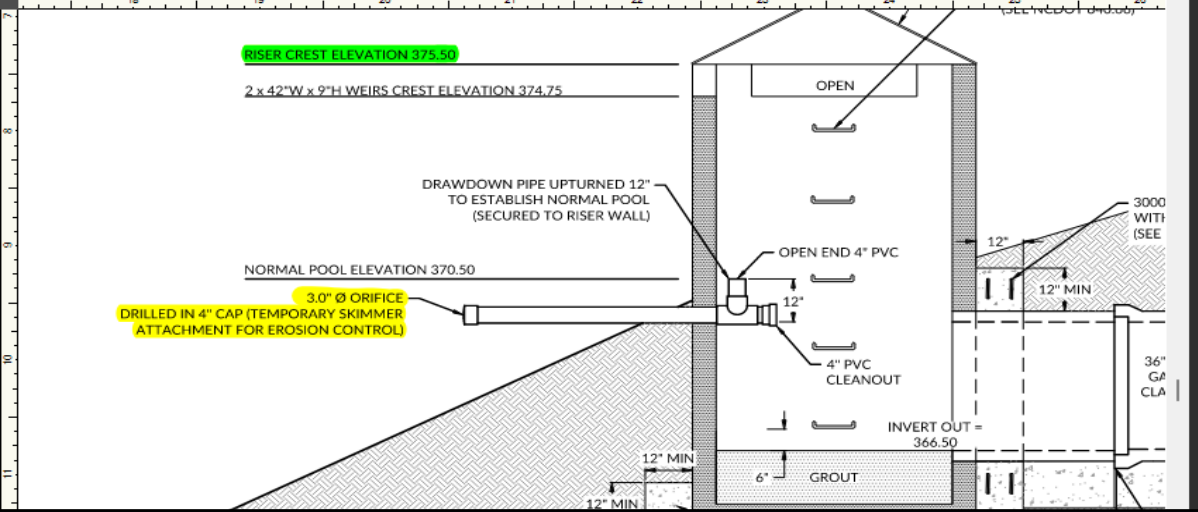
Single height baffles ✗

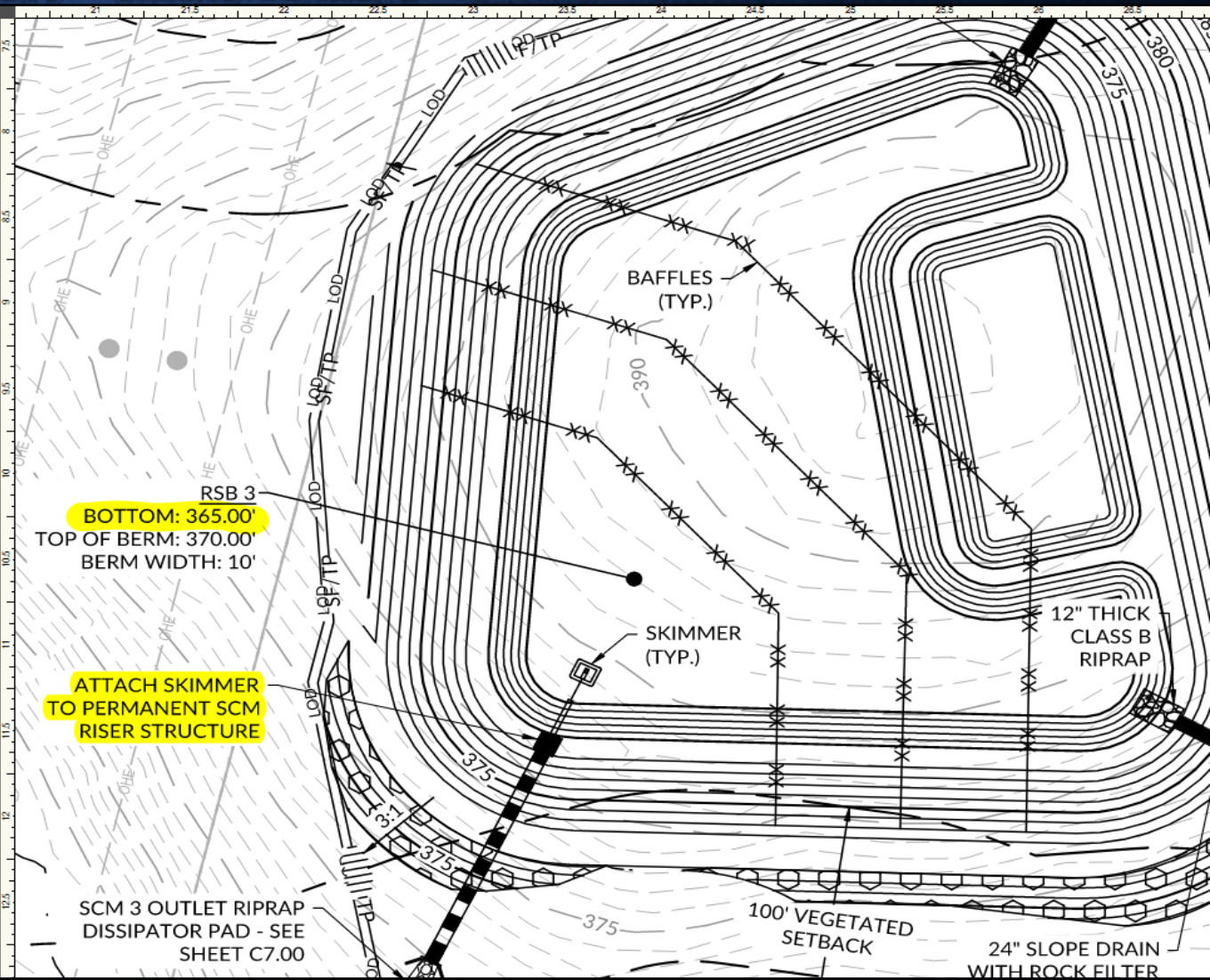
DESIGN STANDARDS

RISER BASIN – EXAMPLE 1



Design Plan*

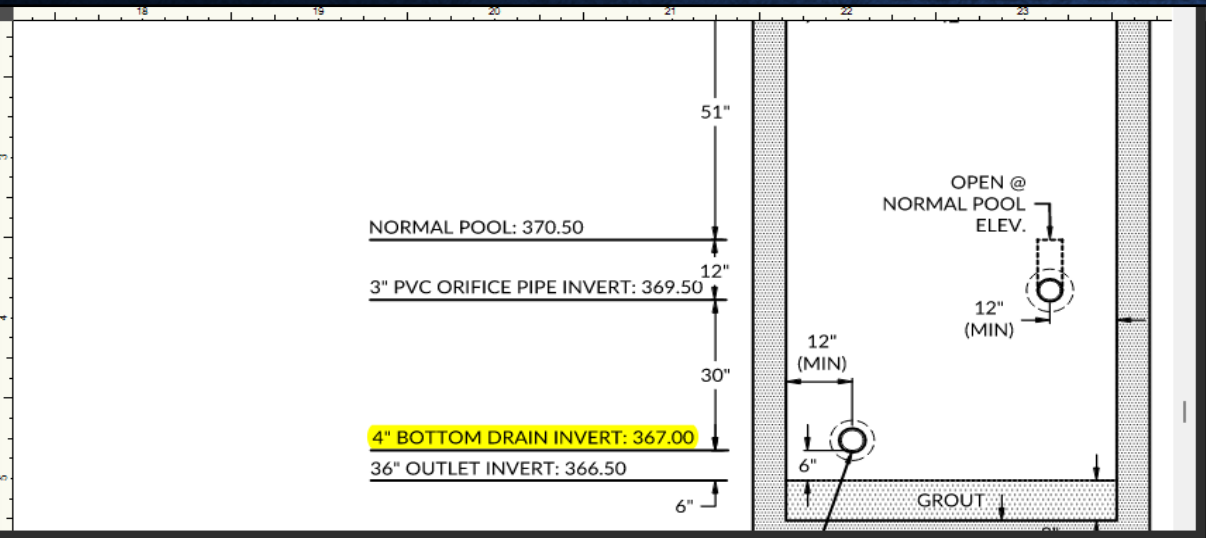




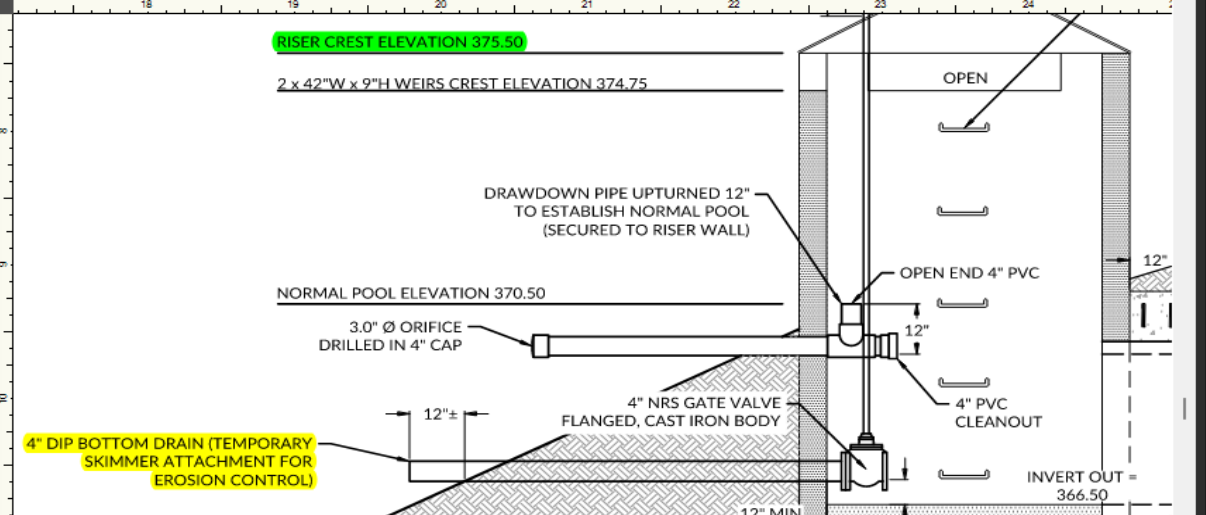
CHATHAM COUNTY
NORTH CAROLINA

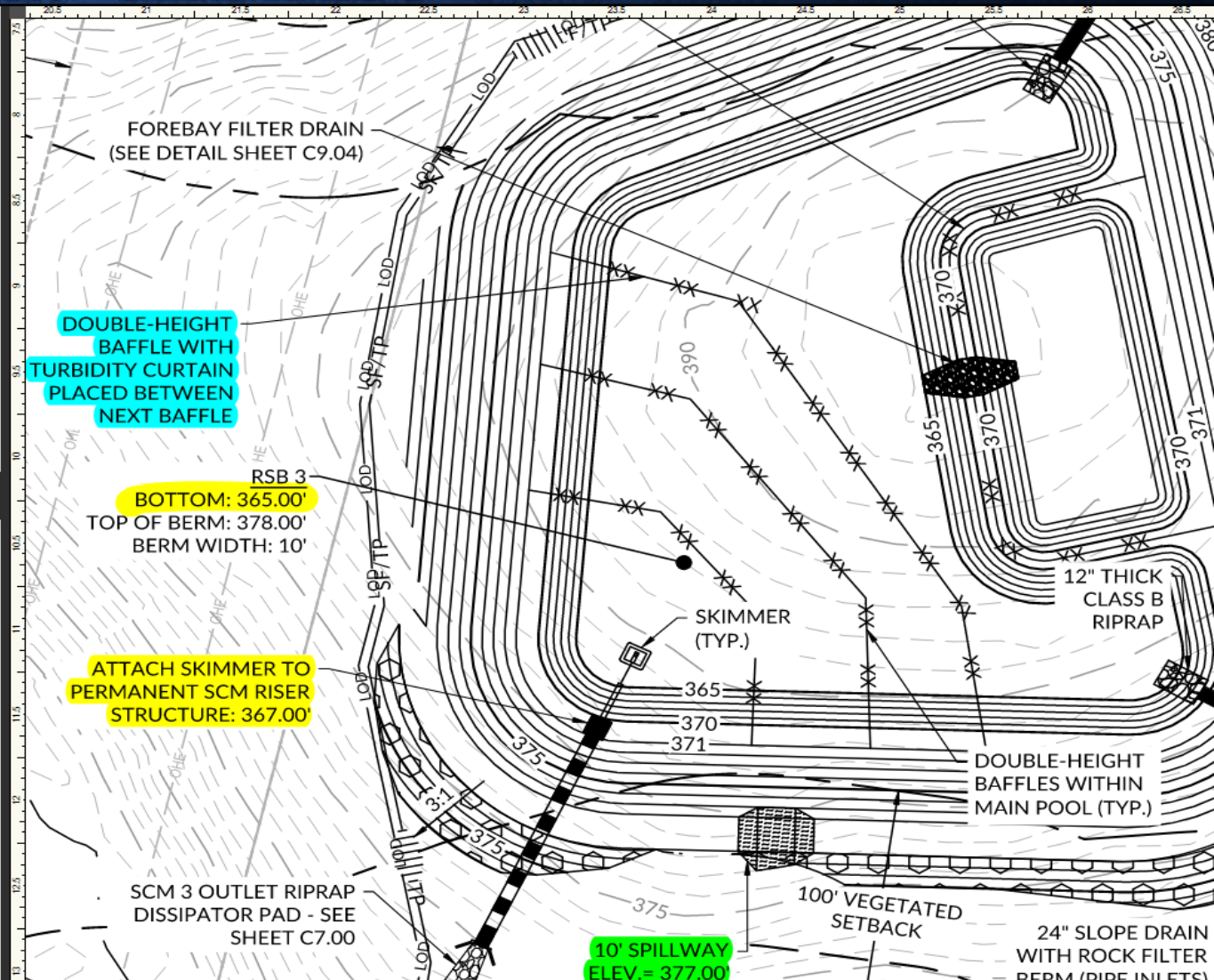
DESIGN STANDARDS

RISER BASIN – EXAMPLE 1



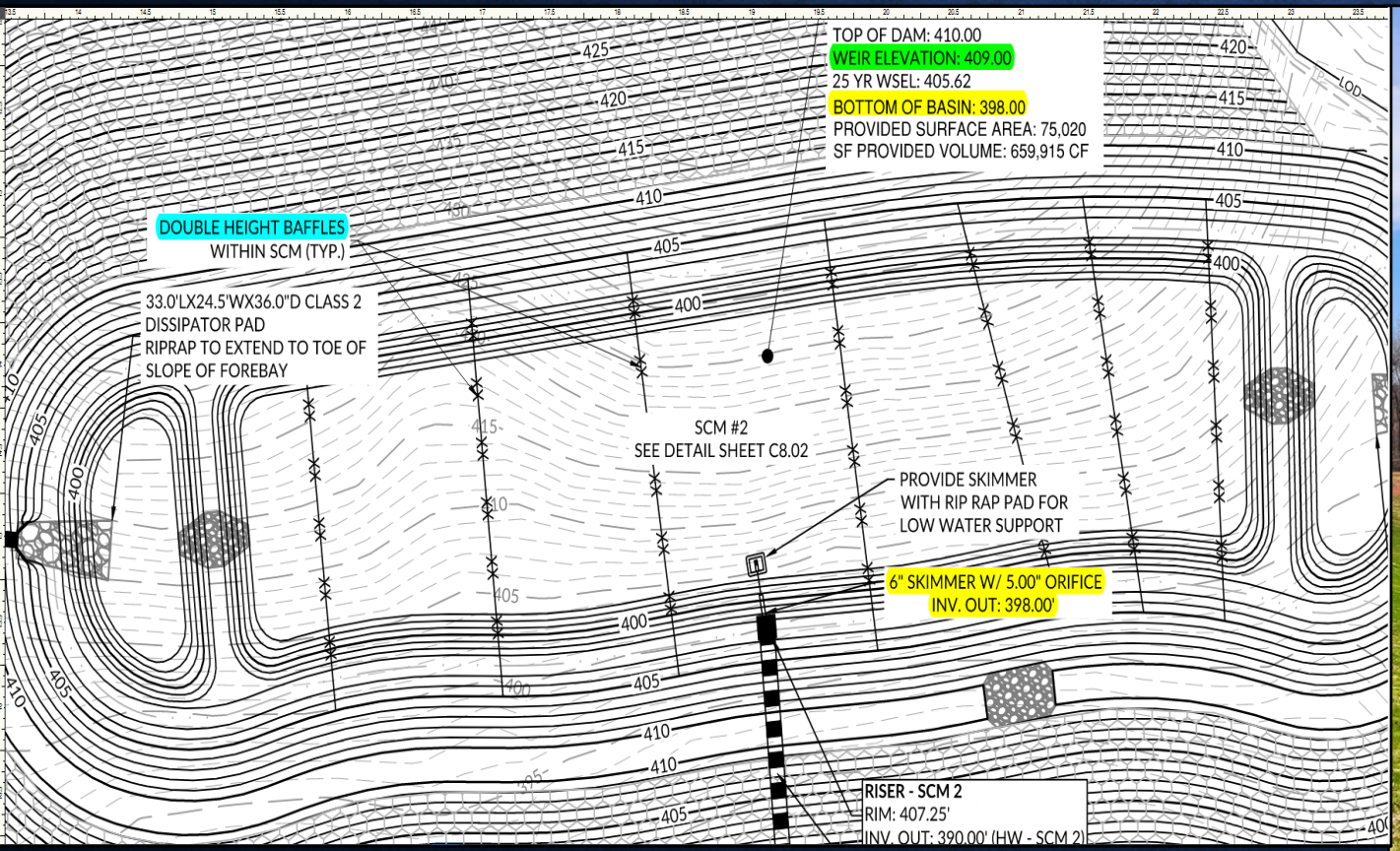
Approved Erosion Control Plan REVISED 10-24-25*





DESIGN STANDARDS

RISER BASIN – EXAMPLE 2

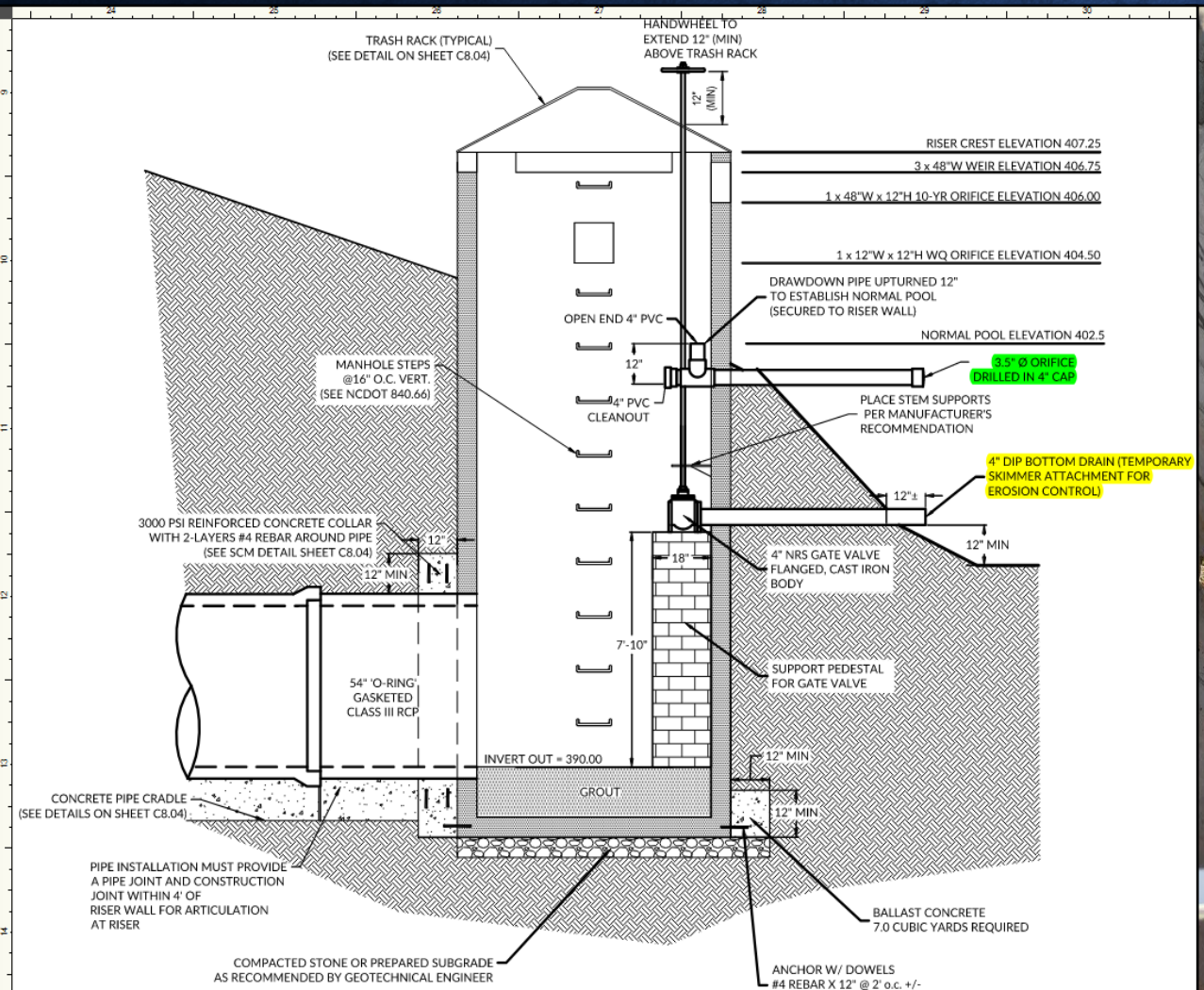


Sediment basin to permanent depth

CHATHAM COUNTY
NORTH CAROLINA

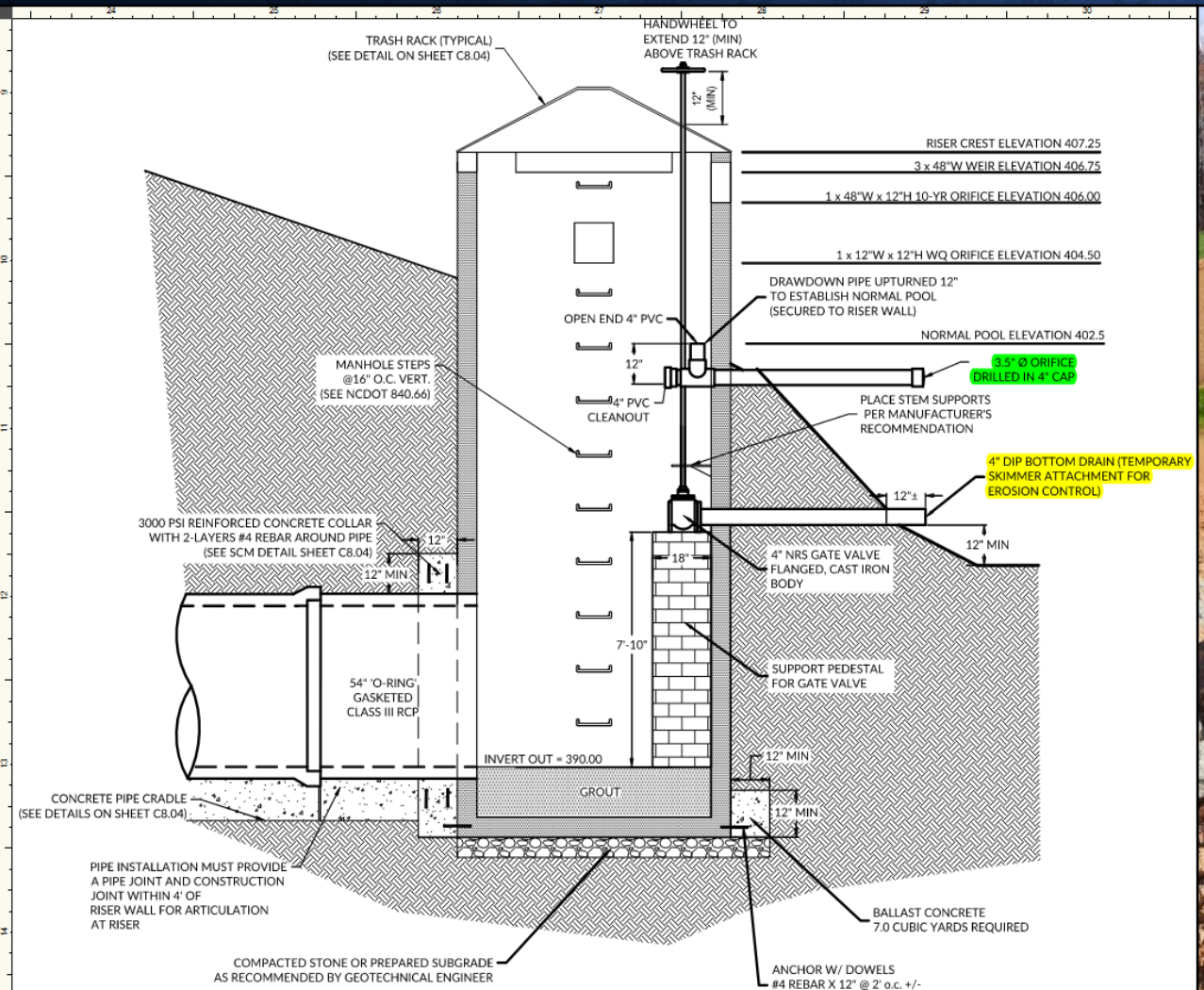
DESIGN STANDARDS

RISER BASIN – EXAMPLE 2



DESIGN STANDARDS

RISER BASIN – EXAMPLE 2



CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

RISER BASIN - EXAMPLE 2

CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

RISER BASIN – EXAMPLE 2

DESIGN STANDARDS

ALL BASINS

Other:

- Basin shape = 2:1 to 6:1
- Longest flow path
- No sheet flow
- Stable inlets
  - Slope drain
  - Rip rap lined

SLOPE DRAIN SIZING

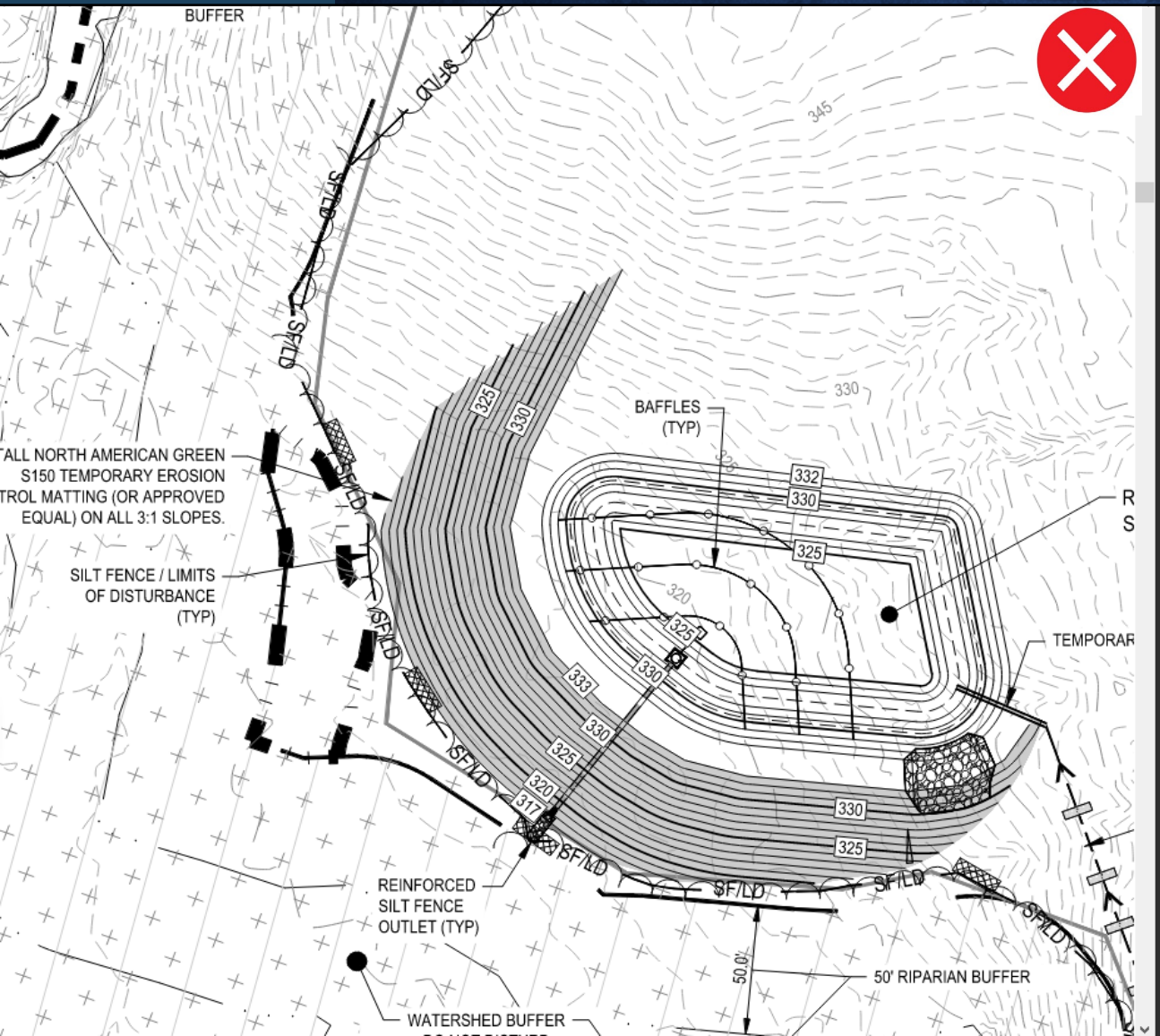
Slope Drain ID	Diversion Ditch ID	Drainage Area (Ac)	C	I (Q_{25}, in/hr)	Q_{25} (cfs)	Ditch Depth (ft)	Slope Drain Size (in)	Slope Drain Area (SF)	h Value (ft)	Slope Drain Capacity (cfs)
1	DD-1	0.06	0.60	8.30	0.30	1.0	15	1.23	0.375	3.62
2	DD-2	0.61	0.60	8.30	3.04	1.5	15	1.23	0.875	5.53
3	DD-3	0.24	0.60	8.30	1.20	1.0	15	1.23	0.375	3.62
4	DD-4 & 7	2.43	0.60	8.30	12.10	2.0	24	3.14	1.000	15.13
5	DD-5	1.00	0.60	8.30	4.98	1.5	15	1.23	0.875	5.53
6	DD-6	1.48	0.60	8.30	7.37	1.5	18	1.77	0.750	7.37

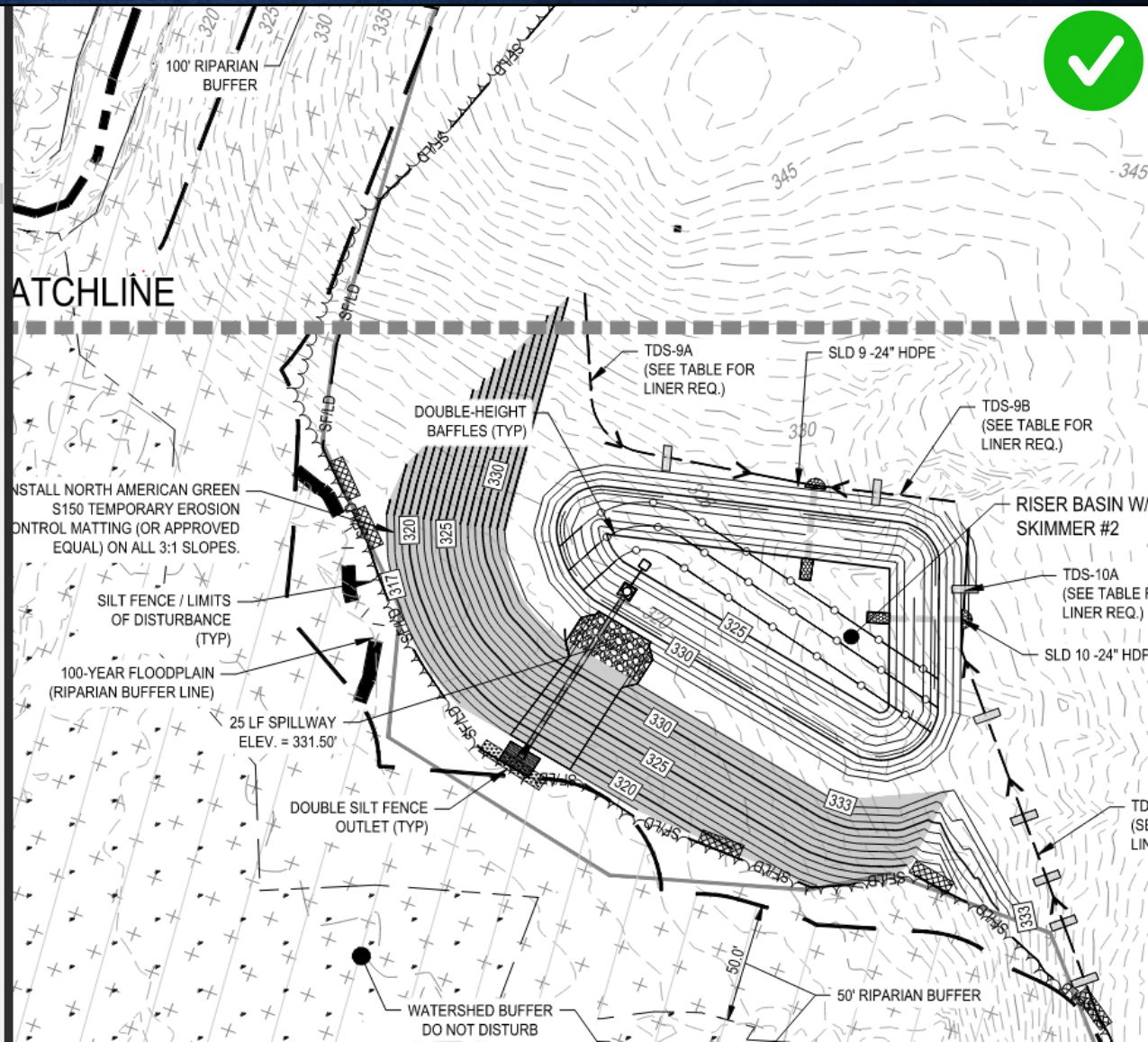
** Basin side slope to be armored with 12" NCDOT Class B Rip Rap (d50 = 6") with geotextile fabric base.

CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

ALL BASINS





DESIGN STANDARDS

ALL BASINS

Other:

- Stabilize all areas disturbed by construction

- Outlet protection

DESIGN STANDARDS

TEMPORARY SEDIMENT TRAPS

Criteria:

- Used for smaller drainage areas
- Miniature basin with no skimmer
- Capacity, stone outlet, and stabilization very important

Design Criteria

Summary:	Temporary Sediment Trap
Primary Spillway:	Stone Spillway
Maximum Drainage Area:	5 acres
Minimum Volume:	3600 cubic feet per acre of disturbed area
Minimum Surface Area:	435 square feet per cfs of Q_{10} peak inflow
Minimum L/W Ratio:	2:1
Minimum Depth:	3.5 feet, 1.5 feet excavated below grade
Maximum Height:	Weir elevation 3.5 feet above grade
Dewatering Mechanism:	Stone Spillway
Minimum Dewatering Time:	N/A
Baffles Required:	3

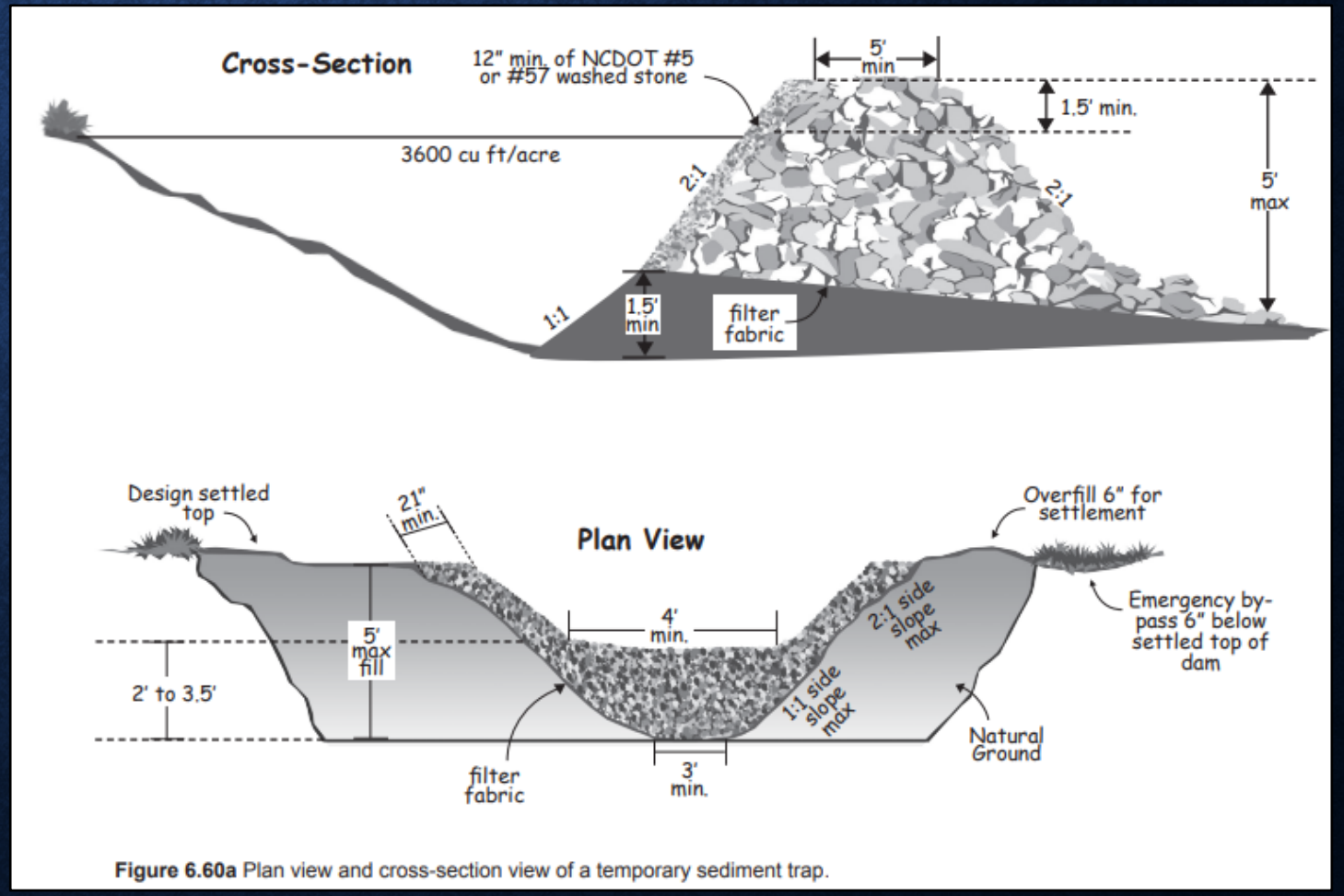


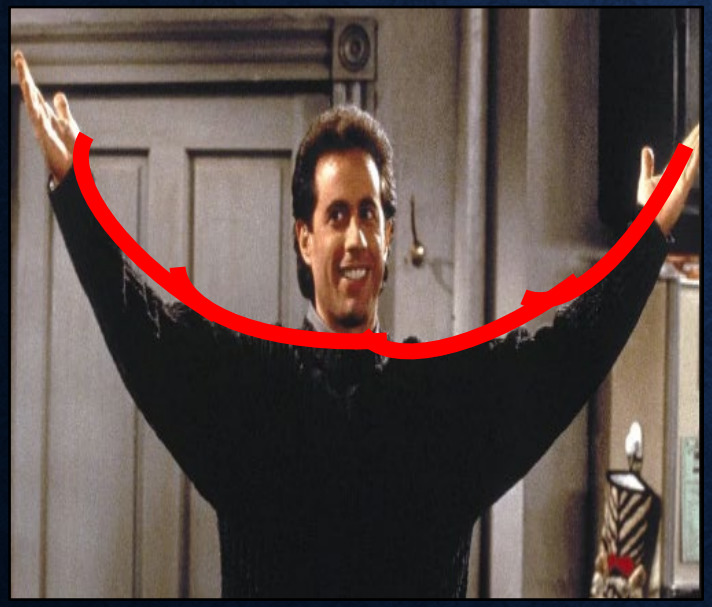
Figure 6.60a Plan view and cross-section view of a temporary sediment trap.

CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

DITCH/SWALE

Parabolic



Trapezoidal

Triangular

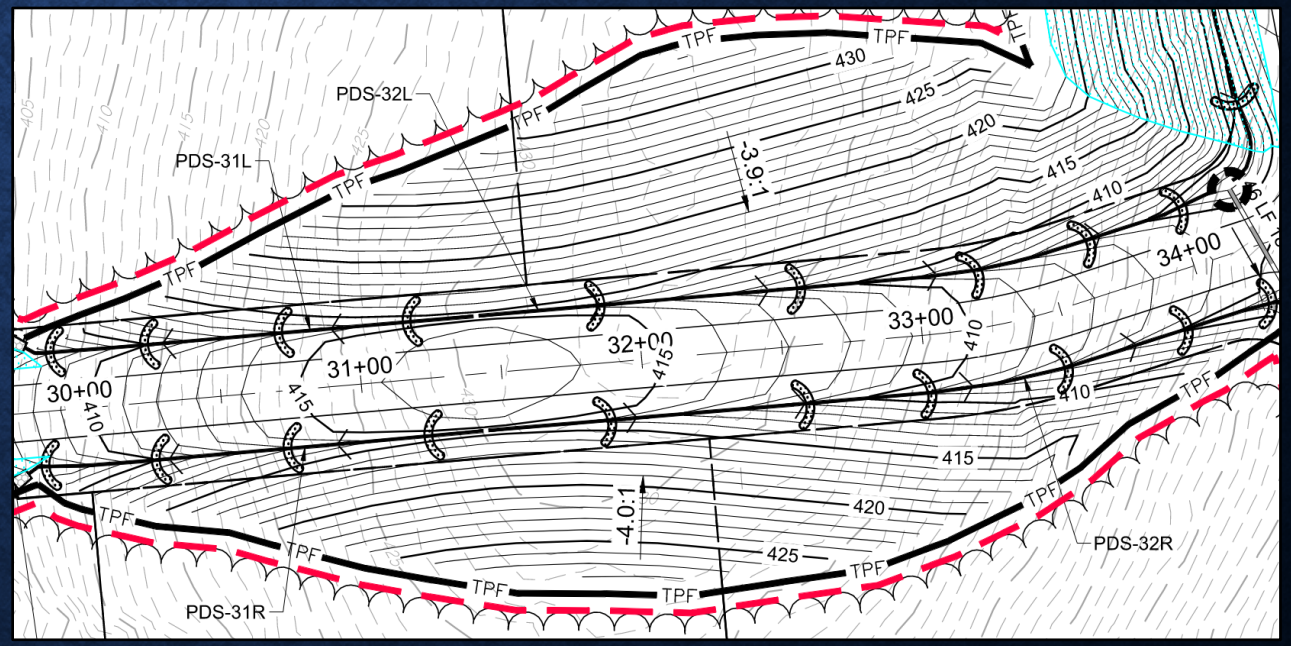
Design and site conditions dictate.

DESIGN STANDARDS

DITCH/SWALE

Capacity

- 10-year storm w/o eroding
- Increased capacity for flood hazards
- Check dams/wattles every 2’ in grade change

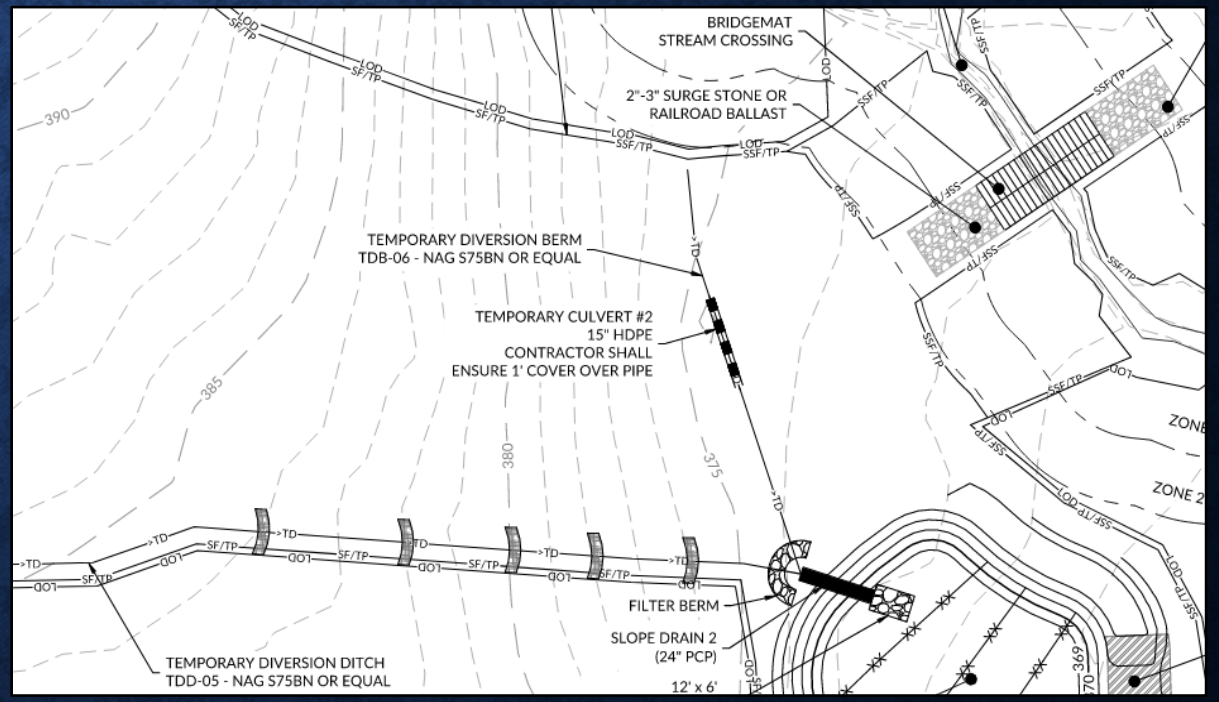


DESIGN STANDARDS

DITCH/SWALE

Grade

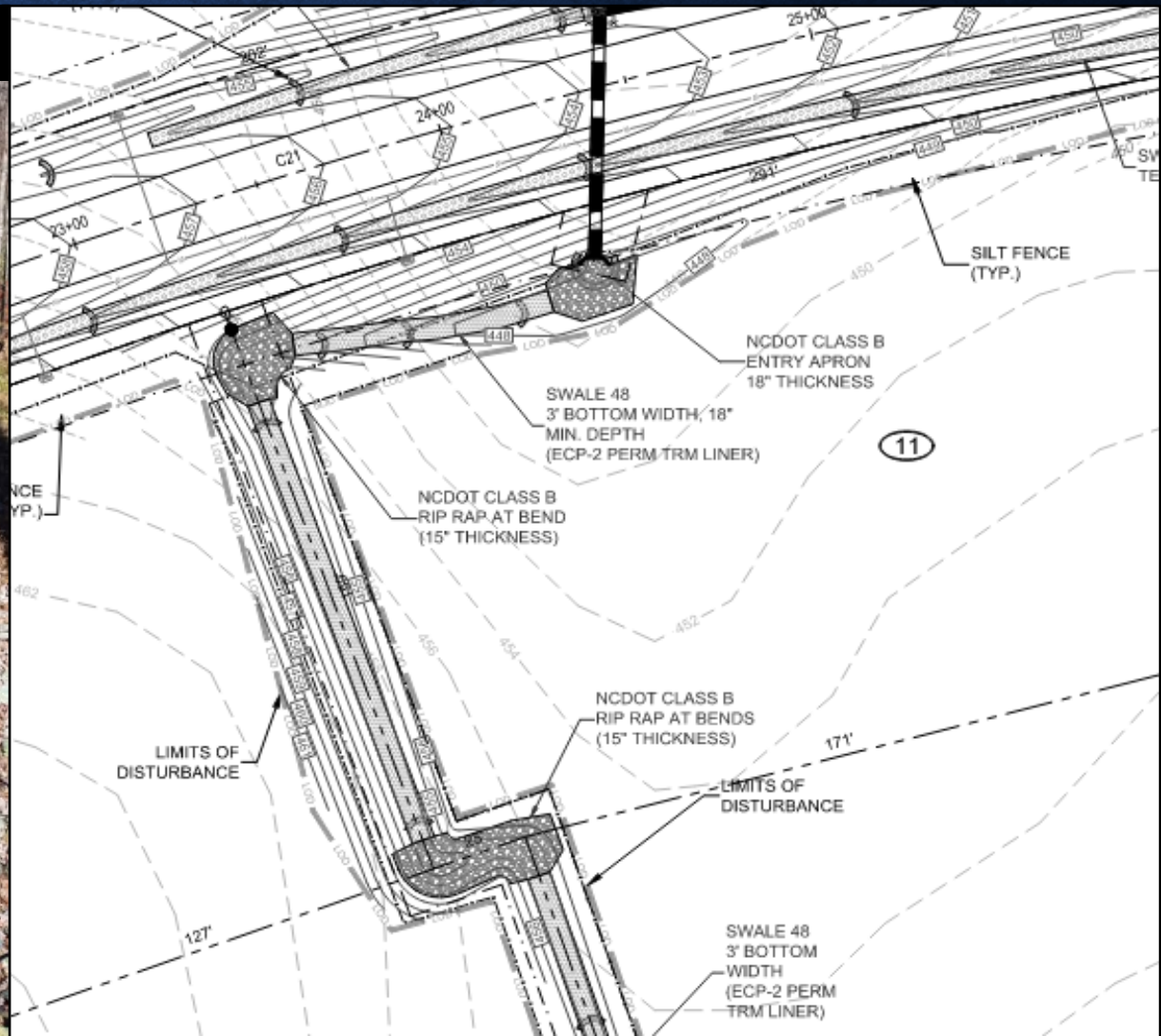
- Positive drainage
- Uniform or gradually increasing
- 3:1 slopes or flatter
- Ditch should be uninterrupted



DESIGN STANDARDS

DITCH/SWALE

Riprap for excessive grade/sharp turns



DESIGN STANDARDS

DITCH/SWALE

Drainage Area

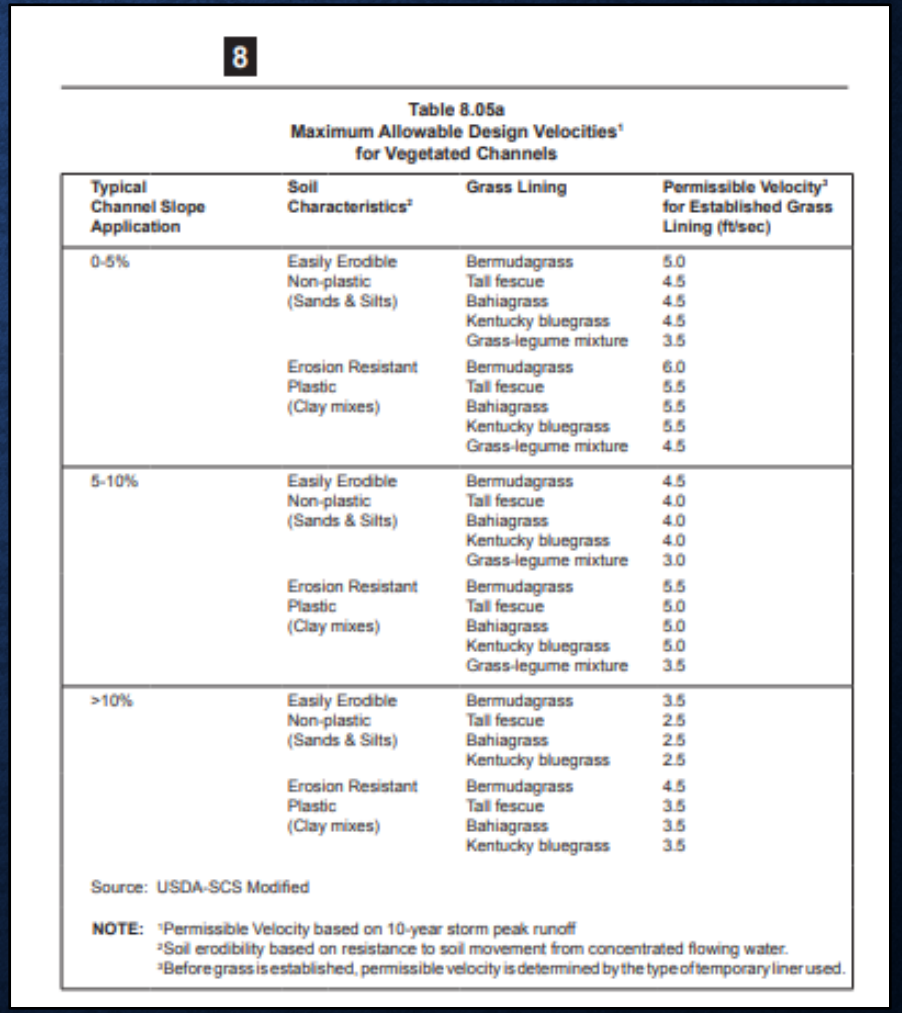
- Drainage areas should match calcs
- Most onsite drainage should be accounted for
- Basin drainage > sum of ditches

DESIGN STANDARDS

DITCH/SWALE

Velocity

- Allowable design determined by soil conditions, type of vegetation, method of establishment
- Maximum permissible velocities table
- Preferred < 5.0 ft/sec up to 6.0 ft/sec
- Velocity > 2.0 ft/sec requires liner
  - Temporary liner: 2-year storm
  - Permanent liner: 10-year storm



8

Table 8.05a
Maximum Allowable Design Velocities[1]
for Vegetated Channels

Typical Channel Slope Application	Soil Characteristics[2]	Grass Lining	Permissible Velocity[3] for Established Grass Lining (ft/sec)
0-5%	Easily Erodible Non-plastic (Sands & Silts)	Bermudagrass	5.0
		Tall fescue	4.5
		Bahiagrass	4.5
		Kentucky bluegrass	4.5
		Grass-legume mixture	3.5
	Erosion Resistant Plastic (Clay mixes)	Bermudagrass	6.0
		Tall fescue	5.5
		Bahiagrass	5.5
		Kentucky bluegrass	5.5
		Grass-legume mixture	4.5
5-10%	Easily Erodible Non-plastic (Sands & Silts)	Bermudagrass	4.5
		Tall fescue	4.0
		Bahiagrass	4.0
		Kentucky bluegrass	4.0
		Grass-legume mixture	3.0
	Erosion Resistant Plastic (Clay mixes)	Bermudagrass	5.5
		Tall fescue	5.0
		Bahiagrass	5.0
		Kentucky bluegrass	5.0
		Grass-legume mixture	3.5
>10%	Easily Erodible Non-plastic (Sands & Silts)	Bermudagrass	3.5
		Tall fescue	2.5
		Bahiagrass	2.5
		Kentucky bluegrass	2.5
	Erosion Resistant Plastic (Clay mixes)	Bermudagrass	4.5
		Tall fescue	3.5
		Bahiagrass	3.5
		Kentucky bluegrass	3.5

Source: USDA-SCS Modified

NOTE: [1]Permissible Velocity based on 10-year storm peak runoff
[2]Soil erodibility based on resistance to soil movement from concentrated flowing water.
[3]Before grass is established, permissible velocity is determined by the type of temporary liner used.

DESIGN STANDARDS

DITCH/SWALE

Shear Stress

- Is the point at which soil will erode
- Determines what liner is required
- Liner: Appendix 8 of NCDEQ Manual
- Calculated shear stress < permissible shear stress of liner

Table 8.05g
Permissible Shear Stresses for Riprap and Temporary Liners

Lining Category	Lining Type	Permissible Unit Shear Stress, T_d (lb/ft²)
Temporary	Woven Paper Net	0.15
	Jute Net	0.45
	Fiberglass Roving:	
	Single	0.60
	Double	0.85
	Straw with Net	1.45
	Curled Wood mat	1.55
	Synthetic Mat	2.00
	d_{50} **Stone Size** (inches)	
Gravel Riprap	1	0.33
	2	0.67
Rock Riprap	6	2.00
	9	3.00
	12	4.00
	15	5.00
	18	6.00
	21	7.80
	24	8.00

Adapted From: FHWA, HEC-15, April 1983, pgs. 17 & 37.

DESIGN STANDARDS

DITCH/SWALE

Material Content		
Matrix	100% Coconut Fiber	0.5 lbs/sq yd (0.27 kg/sm)
Netting	Leno Woven 100% biodegradable jute	9.3 lbs/1000 sq ft (4.5 kg/100 sm)
	100% Biodegradable jute	7.7 lb/1000 sq ft (3.76 kg/100 sm)
Thread	Biodegradable	

ROLLMAX™
ROLLED EROSION CONTROL

Specification Sheet
BioNet® C125BN™ Erosion Control Blanket

DESCRIPTION

The long-term double net erosion control blanket shall be a machine-produced mat of 100% coconut fiber with a functional longevity of up to 36 months. (NOTE: functional longevity may vary depending upon climatic conditions, soil, geographical location, and elevation). The blanket shall be of consistent thickness with the coconut evenly distributed over the entire area of the mat. The blanket shall be covered on the top and bottom sides with 100% biodegradable woven natural organic fiber netting. The netting shall consist of machine directional strands formed from two intertwined yarns with cross directional strands interwoven through the the twisted machine strands (commonly referred to as Leno weave) to form an approximate 0.50 x 1.0 in (1.27 x 2.54 cm) mesh. The blanket shall be sewn together on 1.50 inch (3.81 cm) centers with degradable thread. The blanket shall be manufactured with a colored thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) as an overlap guide for adjacent mats.

The C125BN shall meet Type 4 specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) FP-03 Section 713.17

Material Content		
Matrix	100% Coconut Fiber	0.5 lbs/sq yd (0.27 kg/sm)
Netting	Leno Woven 100% biodegradable jute	9.3 lbs/1000 sq ft (4.5 kg/100 sm)
	100% Biodegradable jute	7.7 lb/1000 sq ft (3.76 kg/100 sm)
Thread	Biodegradable	

Standard Roll Sizes		
Width	6.67 (2.03 m)	8.0 ft (2.4 m)
Length	108 ft (32.92 m)	112 ft (34.14 m)
Weight ± 10%	52.22 lbs (23.69 kg)	65.25 lbs (29.61 kg)
Area	80 sq yd (66.9 sm)	100 sq yd (83.61 sm)
	Leno weave top only	Leno weave top and bottom

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.22 in. (5.84 mm)
Resiliency	ECTC Guidelines	85%
Water Absorbency	ASTM D1117	365%
Mass/Unit Area	ASTM D475	9.70 oz/sy (329 g/sm)
Swell	ECTC Guidelines	40%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	0.11 oz-in
Light Penetration	ASTM D6567	16.2%
Tensile Strength - MD	ASTM D6818	206.4 lbs/ft (3.06 kN/m)
Elongation - MD	ASTM D6818	15.3%
Tensile Strength - TD	ASTM D6818	145.2 lbs/ft (2.15 kN/m)
Elongation - TD	ASTM D6818	12.9%
Biomass Improvement	ASTM 7322	472%

Design Permissible Shear Stress	
Unvegetated Shear Stress	2.35 psf (112 Pa)
Unvegetated Velocity	10.0 fps (3.05 m/s)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.0001	0.018	0.050
20-50 ft	0.003	0.040	0.060
≥ 50 ft (15.2 m)	0.007	0.070	0.070

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.022
0.50 – 2.0 ft	0.022-0.014
≥ 2.0 ft (0.60 m)	0.014

NORTH AMERICAN GREEN

Western Green
4609 E. Boonville-New Harmony Rd.
Evansville, IN 47725

nagreen.com
800-772-2040

NC_RMX_MPDS_C125BN_119

Design Permissible Shear Stress	
Unvegetated Shear Stress	2.35 psf (112 Pa)
Unvegetated Velocity	10.0 fps (3.05 m/s)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.0001	0.018	0.050
20-50 ft	0.003	0.040	0.060
≥ 50 ft (15.2 m)	0.007	0.070	0.070

Roughness Coefficients – Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.022
0.50 – 2.0 ft	0.022-0.014
≥ 2.0 ft (0.60 m)	0.014

DESIGN STANDARDS

DITCH/SWALE

Physical Characteristics of Drainage Swale							
Chan Bot Width (ft)	Side Slope	Side Slope Length (ft)	Design Depth (ft)	Channel Area (sf)	Wetted Perim., Pw (ft)	Hydraulic Radius (ft)	Channel Slope (ft/ft)
2	2	4.5	2	12.0	10.94	1.10	0.04

Rational Equation for 2 year storm				Addition flow from upstream Swales			Total Flow (cfs)
C Factor	Intensity Inch/hr	Drainage Area (Acres)	Q2 Discharge (Cfs)	Upstream swale# - Flow (cfs)	Upstream swale# - Flow (cfs)	Upstream swale# - Flow (cfs)	
0.50	5.88	1.13	**3.32**	0.00	0.00	0.00	**3.32**

Rational Equation for 10 year storm				Addition flow from upstream Swales			Total Flow (cfs)
C Factor	Intensity Inch/hr	Drainage Area (Acres)	Q10 Discharge (Cfs)	Upstream swale# - Flow (cfs)	Upstream swale# - Flow (cfs)	Upstream swale# - Flow (cfs)	
0.50	7.48	1.13	**4.23**	0.00	0.00	0.00	**4.23**

Bare Soil calculations (Q2)				
Mannings "n"	Q Allow.	AutoCad Depth (in)	AutoCad Velocity (fps)	Shear Stress (lb/sf)
0.020	190.12	3.1	5.17	0.65

Temporary liner calculations (Q2)				
Mannings "n"	Q Allow.	AutoCad Depth (in)	AutoCad Velocity (fps)	Shear Stress (lb/sf)
0.028	135.80	3.7	4.09	0.77

Permanent liner calculations (Q10)				
Mannings "n"	Q Allow.	AutoCad Depth (in)	AutoCad Velocity (fps)	Shear Stress (lb/sf)
0.030	126.75	4.4	4.17	0.92

Bare Soil				
Material	Recommended n Values for Flow Depth			Permissible velocitiy (fps)
	0-0.5 ft	0.5-2.0 ft	> 2.0 ft	
Bare Soil	0.023	0.02	0.02	2.00

Temporary Liners				
*Material	Recommended n Values for Flow Depth			Allowable Shear Stress (lb/sf)
	0-0.5 ft	0.5-2.0 ft	> 2.0 ft	
Unvegetated				
S75	0.055	0.028	0.021	1.55
S150	0.055	0.028	0.021	1.65
SC150	0.050	0.025	0.018	1.80
C125	0.022	0.014	0.014	2.25
C350	0.040	0.025	0.02	2.25
P300	0.034	0.024	0.02	2.00

Permanent Liners				
*Material	Recommended n Values for Flow Depth			Allowable Shear Stress (lb/sf)
	0-0.5 ft	0.5-2.0 ft	> 2.0 ft	
Vegetated				
C350 Phase 2	0.044	0.044	0.044	4.50
C300 Phase 2	0.044	0.044	0.044	4.00
C350 Phase 3	0.049	0.049	0.049	8.00
P300 Phase 3	0.049	0.049	0.049	8.00

Rip Rap Liners				
Material	Recommended n Values for Flow Depth			Allowable Shear Stress (lb/sf)
	0-0.5 ft	0.5-2.0 ft	> 2.0 ft	
Class A	0.044	0.033	0.03	1.65
Class B	0.066	0.041	0.034	3.00
Class I	0.104	0.069	0.035	4.50
Class II	-	0.078	0.04	6.00

Permanent Liners		
Material	Recommended n Values	Permissible velocitiy (fps)
Grass Mixture	0.030	5.00

Notes:
- Spreadsheet works for trapezoidal channel only
- Side slope = horiz./vert.
- Needs input
- Output taken from AutoCad's Trapezoidial Ditch Calculater
- * The Material lists refers to North American Green products. Contractor to use referenced material or approved equal.

Shear Stress, T= y*(d/12)*s
T = shear stress in lb/sq. ft.
y = unit weight of water, 62.4 lb/cu. ft.
d = flow depth in in.
s = channel slope in ft./ft.

Selected Temporary Liner: S75

Selected Permanent Liner: Grass Mixture

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Wednesday, Aug 21 2024

ROADSIDE DITCH #1 10 YR STORM

Trapezoidal

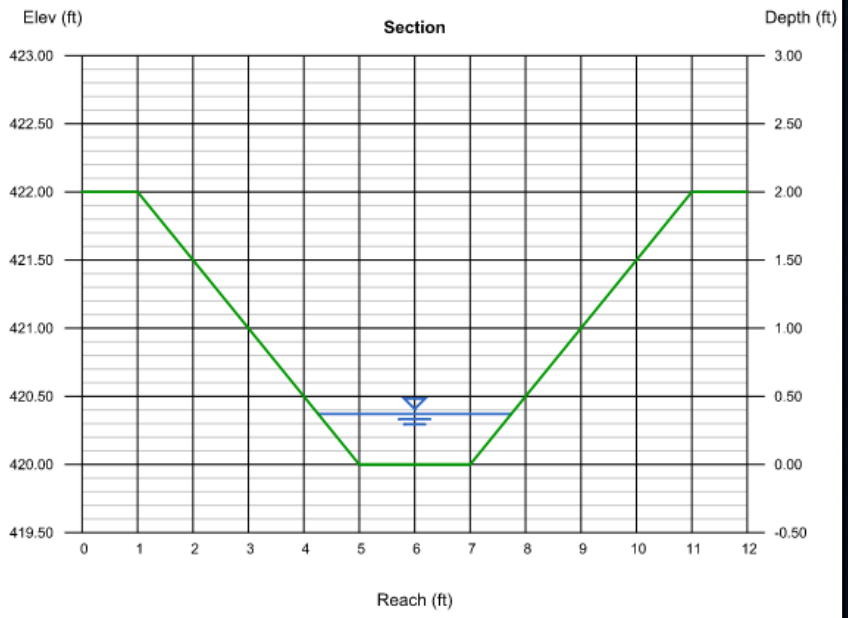
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 420.00
Slope (%)	= 4.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.23

Highlighted

Depth (ft)	= 0.37
Q (cfs)	= 4.230
Area (sqft)	= 1.01
Velocity (ft/s)	= 4.17
Wetted Perim (ft)	= 3.65
Crit Depth, Yc (ft)	= 0.45
Top Width (ft)	= 3.48
EGL (ft)	= 0.64



DESIGN STANDARDS

DITCH/SWALE

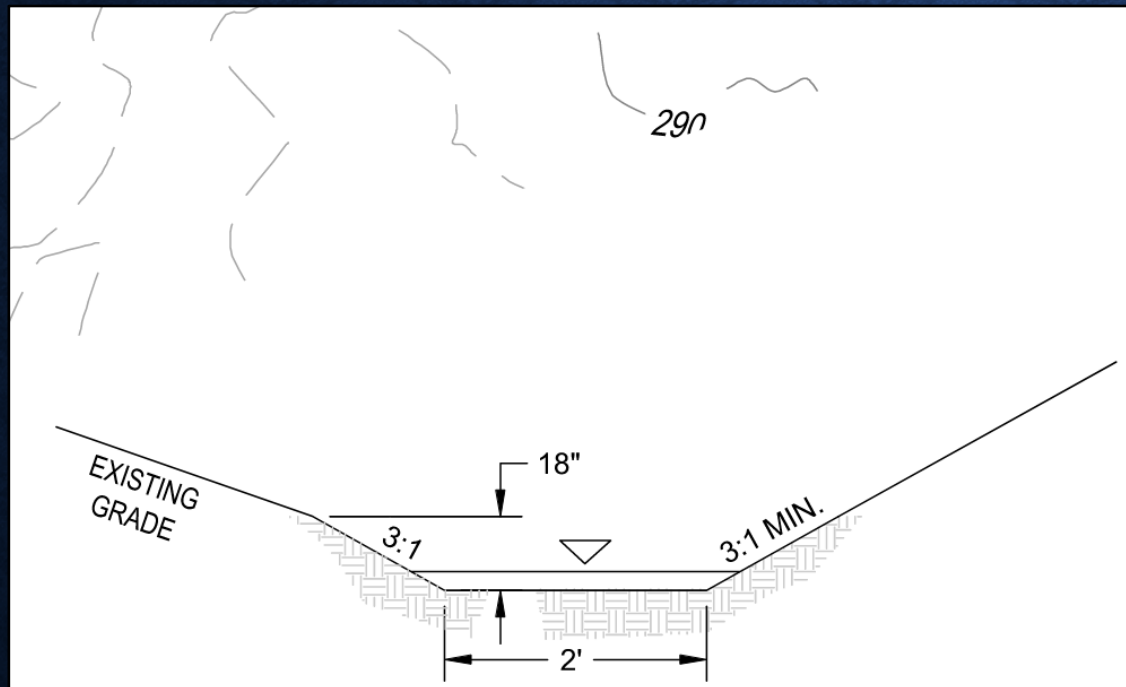
Design Storm	25-YR
Rainfall Intensity	8.26

CHANNEL DESIGN INFORMATION													
CHANNEL I.D.	DRAINAGE AREA (AC)	WEIGHTED 'C' COEFFICIENT	CHANNEL FLOW (CFS)	CHANNEL SLOPE (%)	CHANNEL FLOW DEPTH (FT)	CHANNEL MINIMUM DEPTH (FT)	CHANNEL BOTTOM WIDTH (FT)	CHANNEL SIDE SLOPES	CHANNEL VELOCITY (FPS)	ALLOWABLE VELOCITY (FPS)	CHANNEL SHEAR STRESS (PSF)	ALLOWABLE SHEAR STRESS (PSF)	DITCH LINING
CWTD #1	8.25	0.15	10.23	3.00	0.72	1.50	1.00	3 :1	4.51	5.00	1.34	1.60	NAG S75BN OR EQUAL
CWTD #2	6.02	0.15	7.46	2.80	0.72	1.50	1.00	3 :1	3.29	5.00	1.25	1.60	NAG S75BN OR EQUAL
SCMTD #1	1.65	0.50	6.83	7.00	0.52	1.50	1.00	3 :1	5.20	10.00	2.25	2.25	NAG C125BN OR EQUAL
SCMTD #2	0.22	0.50	0.91	5.00	0.65	1.50	1.00	3 :1	0.47	8.00	2.03	2.10	NAG SC150BN OR EQUAL
SCMTD #3	1.29	0.50	5.33	3.00	0.67	1.50	1.00	3 :1	2.65	5.00	1.25	1.60	NAG S75BN OR EQUAL
SCMTD #4	0.93	0.50	3.83	4.00	0.49	1.50	1.00	3 :1	3.11	5.00	1.23	1.60	NAG S75BN OR EQUAL
SCMTB #5	4.03	0.50	16.66	3.90	0.77	1.50	1.00	3 :1	6.52	8.00	1.87	2.10	NAG SC150BN OR EQUAL
SCMTD #6	0.91	0.50	3.74	1.60	0.65	1.50	1.00	3 :1	1.94	5.00	0.65	1.60	NAG S75BN OR EQUAL
SCMTD #7	1.41	0.15	1.74	3.00	0.77	1.50	1.00	3 :1	0.68	5.00	1.44	1.60	NAG S75BN OR EQUAL
SCMTD #8	2.94	0.41	9.92	1.20	0.77	1.50	1.00	3 :1	3.88	5.00	0.57	1.60	NAG S75BN OR EQUAL
SCMTB #9	4.66	0.50	19.24	1.00	0.65	1.50	1.00	3 :1	9.99	10.00	0.40	2.25	NAG C125BN OR EQUAL
SCMTD #10	1.46	0.50	6.02	2.20	0.77	1.50	1.00	3 :1	2.35	5.00	1.05	1.60	NAG S75BN OR EQUAL

Ditch depth, bottom width, sideslopes, and stabilization liner should be in plan.

DESIGN STANDARDS

DITCH/SWALE



TEMPORARY + PERMANENT
DIVERSION DITCH
TYPICAL SECTION
NOT TO SCALE

Swale ID	Lining Type (or equal)
TDS-19	Eronet DS75
TDS-20	Eronet DS75
TDS-21	Eronet DS75
TDS-22	Eronet SC150
TDS-23	Eronet DS75
TDS-24	Eronet DS75
TDS-25	Eronet DS75
TDS-26	Eronet DS75
TDS-27	Eronet DS75
CWD-2	Eronet DS75
CWD-3	Eronet SC150
PDS-3	Eronet P300

Ditch depth, bottom width, sideslopes, and stabilization liner should be in plan.

DESIGN STANDARDS

TEMPORARY DIVERSIONS

Criteria

- Route construction runoff
- Divert offsite drainage around site
- Similar design to ditches
- Drainage area < 5 acres
- Design to 10-year storm

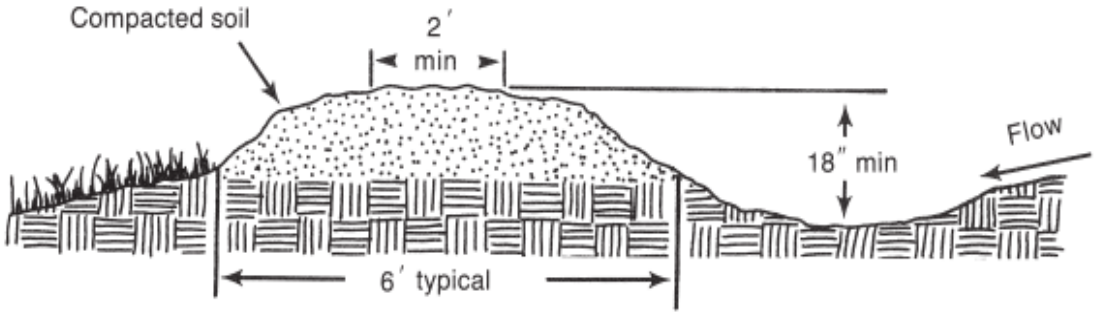


Figure 6.20a Temporary earthen diversion dike.

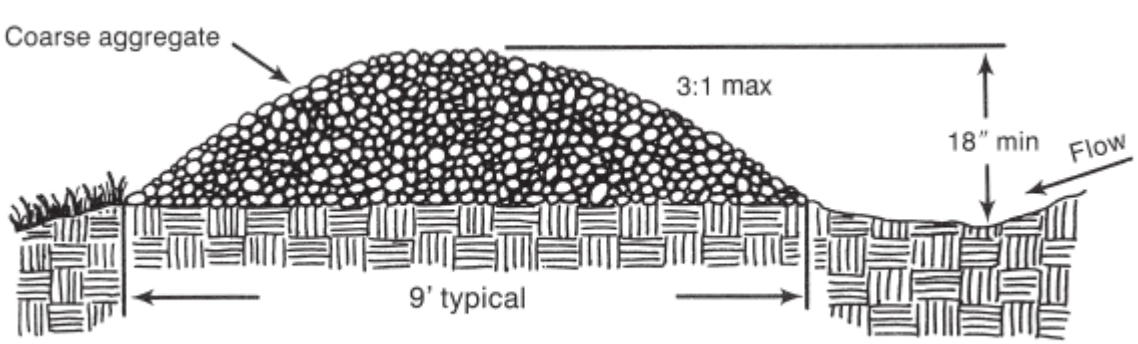


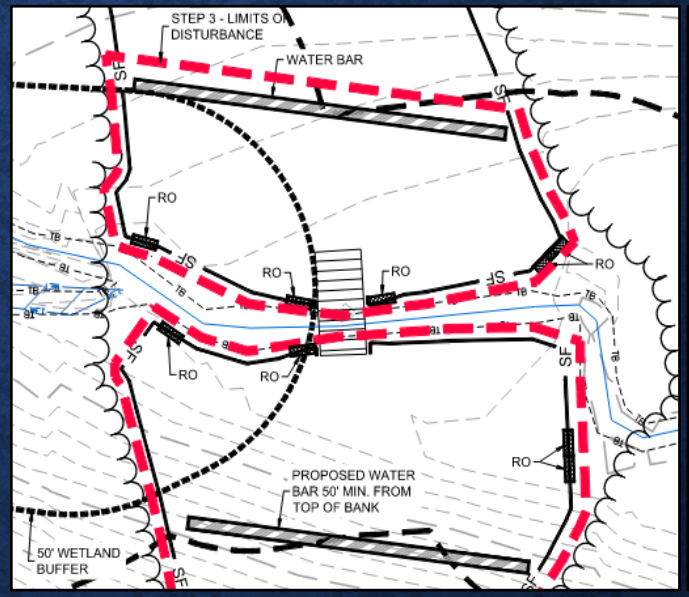
Figure 6.20b Temporary gravel diversion dike for vehicle crossing (modified from Va SWCC).

DESIGN STANDARDS

WATER BARS

Criteria

- Used: dirt roadways, utility corridors, and approaches to surface waters
- Similar design to diversions
- Spacing based on slope



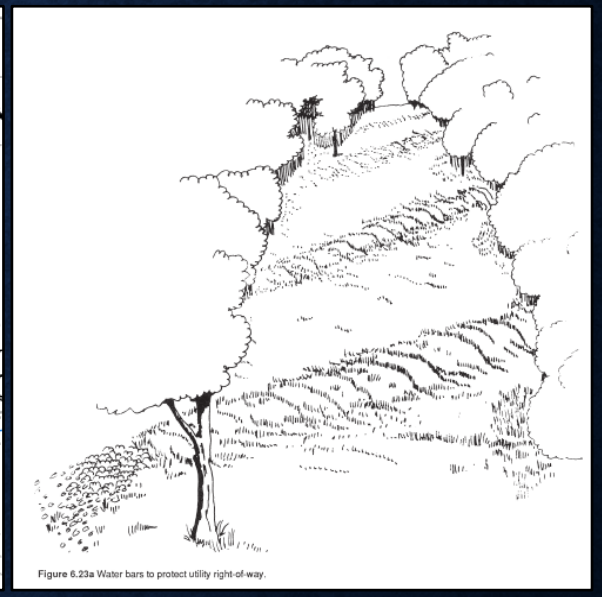


Figure 6.23a Water bars to protect utility right-of-way.

Table 6.23a
Spacing of Water Bars on Right-of-Way Less than 100 ft Wide

Slope (%)	Spacing (Ft)
<5	125
5 to 10	100
10 to 20	75
20 to 35	50
>35	25

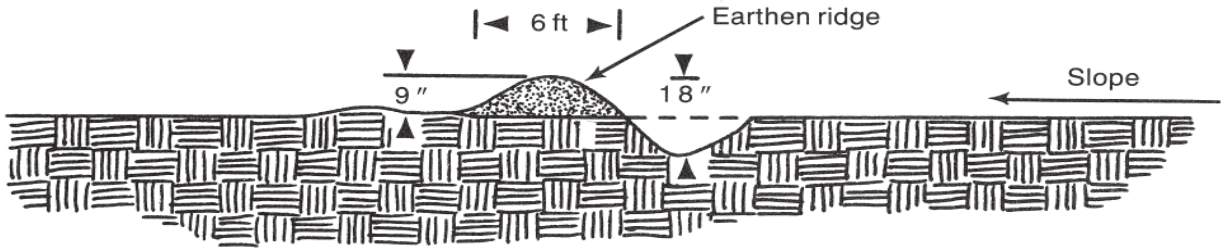


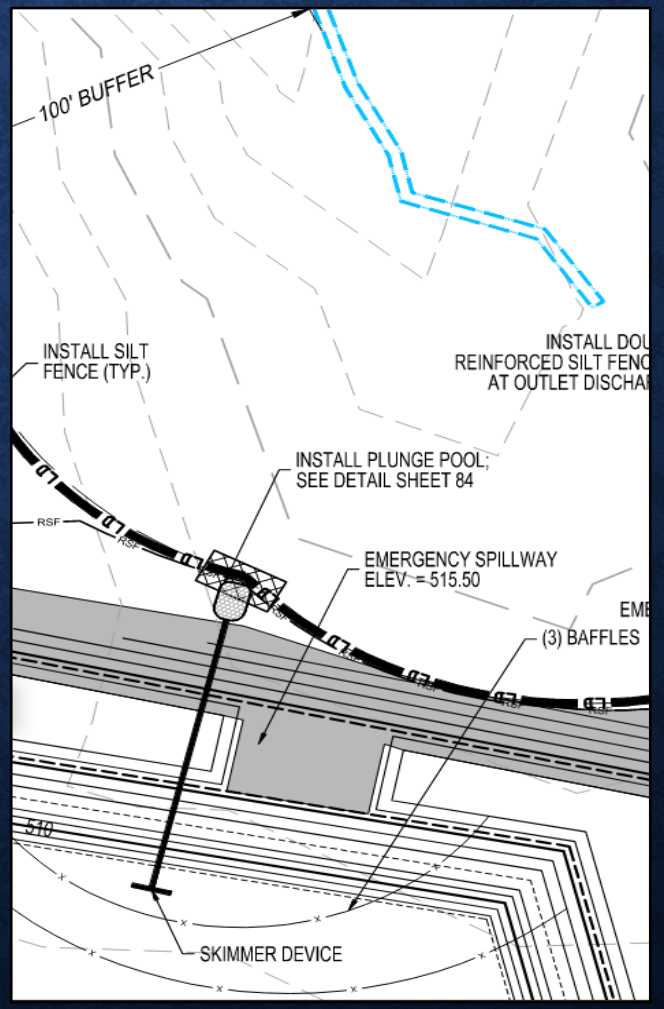
Figure 6.23b Section view of a water bar.

DESIGN STANDARDS

OUTLET PROTECTION

Criteria

- Channel, diversion, and conduit outlets must be stable
- Exit velocity for required design must be non-erosive
- Required design = conveyance
- Filter fabric underliner



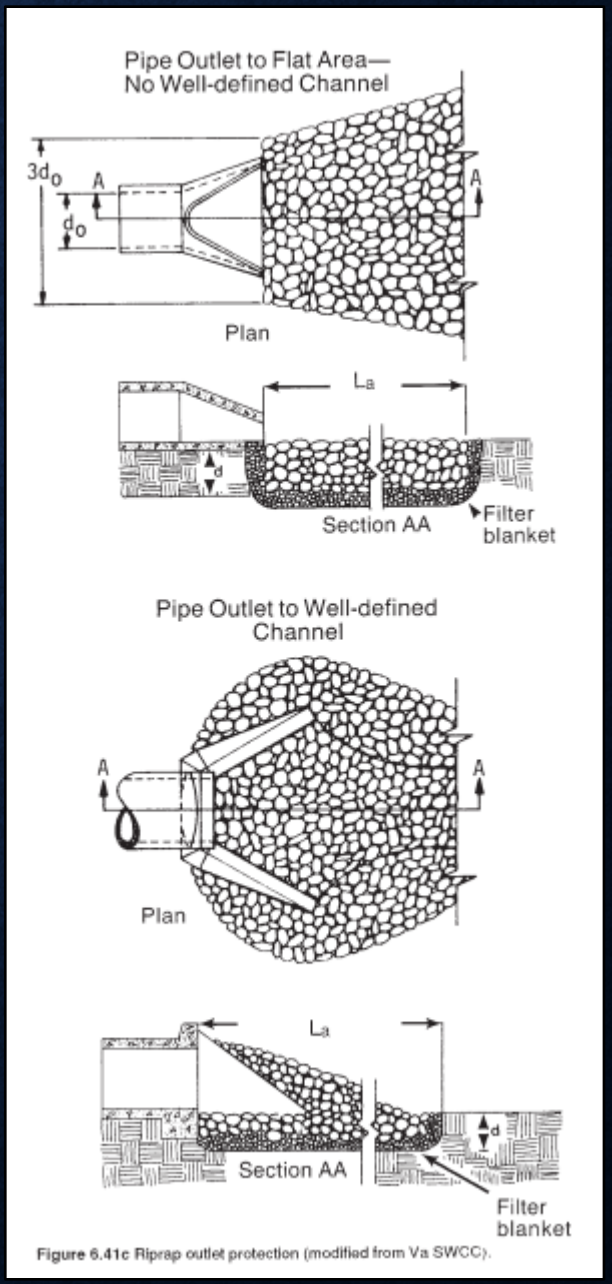


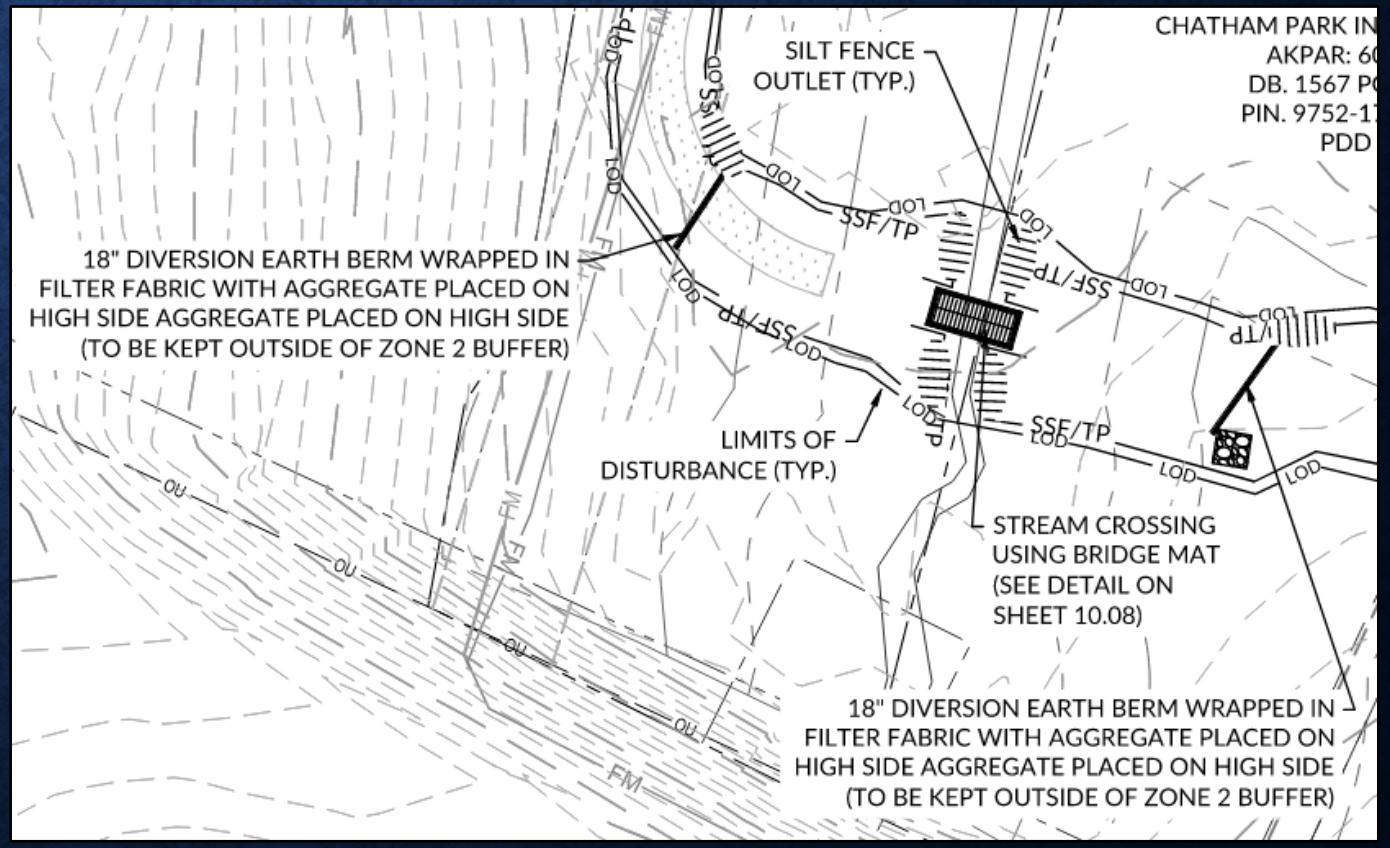
Figure 6.41c Riprap outlet protection (modified from Va SWCC).

DESIGN STANDARDS

TEMPORARY STREAM CROSSING

Planning Considerations

- Try to avoid crossing streams
- If possible, complete development separately on each side
- Installed perpendicular to stream
- Often most sensitive area on site

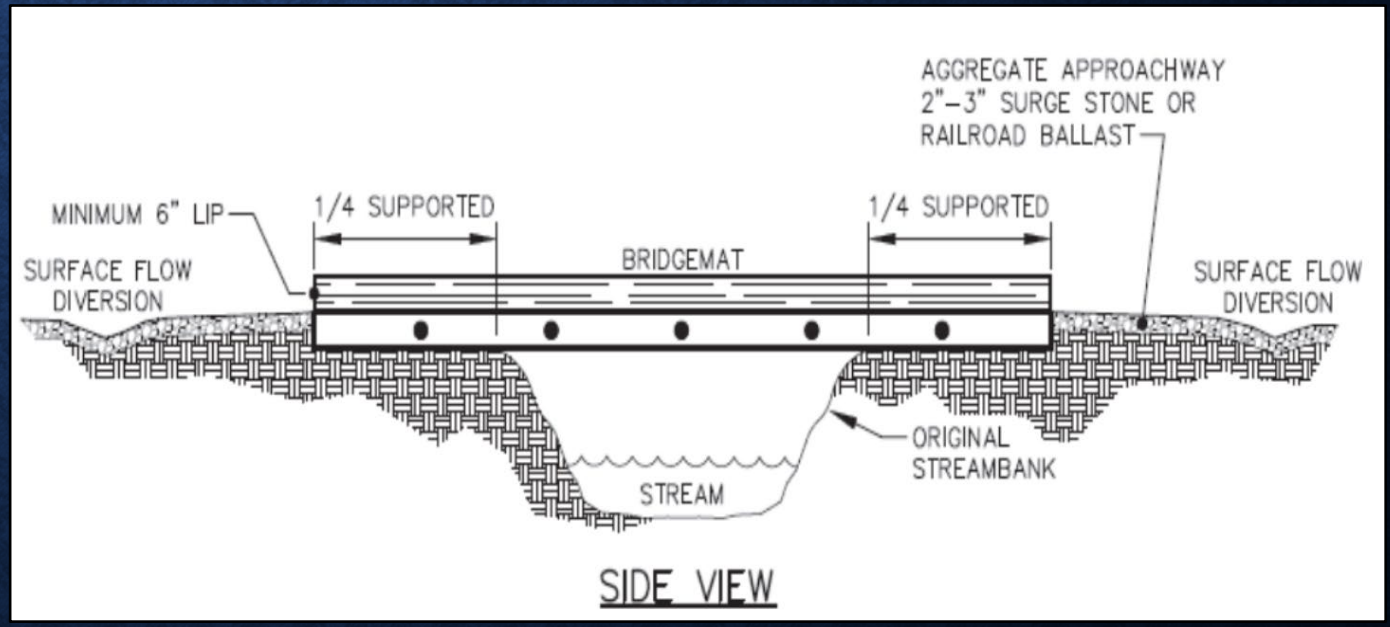


DESIGN STANDARDS

TEMPORARY STREAM CROSSING - BRIDGEMAT

Planning Considerations

- Preferred Method:
  - Least disturbance to stream bed, banks, and surrounding area
  - Often no stream impacts
  - Least obstruction to flow & fish migration
- Must support expected loads

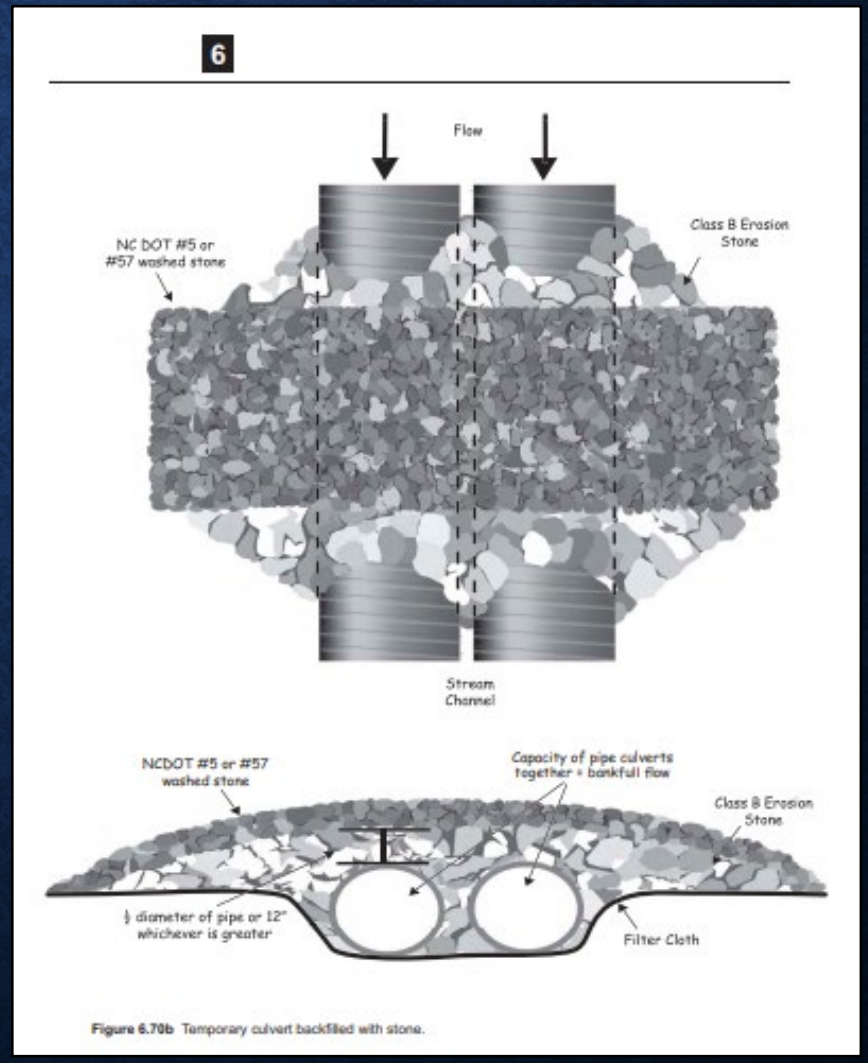


DESIGN STANDARDS

TEMPORARY STREAM CROSSING - PIPED

Planning Considerations

- Adaptable to most site situations
- Safely support heavy loads
- Installation and removal causes considerable disturbance to stream and surrounding area
- Greatest obstruction to flood flows
- Subject to blockage and washout



DESIGN STANDARDS

TEMPORARY STREAM CROSSING - FORD

Planning Considerations

- Used:
  - For steep areas subject to flash flooding
  - Normal flows < 3 inches deep
  - Intermittent streams
  - Only when crossings are infrequent
  - Wide, shallow watercourses
- Safely handle heavy loads
- Little to no obstruction of flow
- Could involve major disturbance in-stream
- Approach area subject to erosion

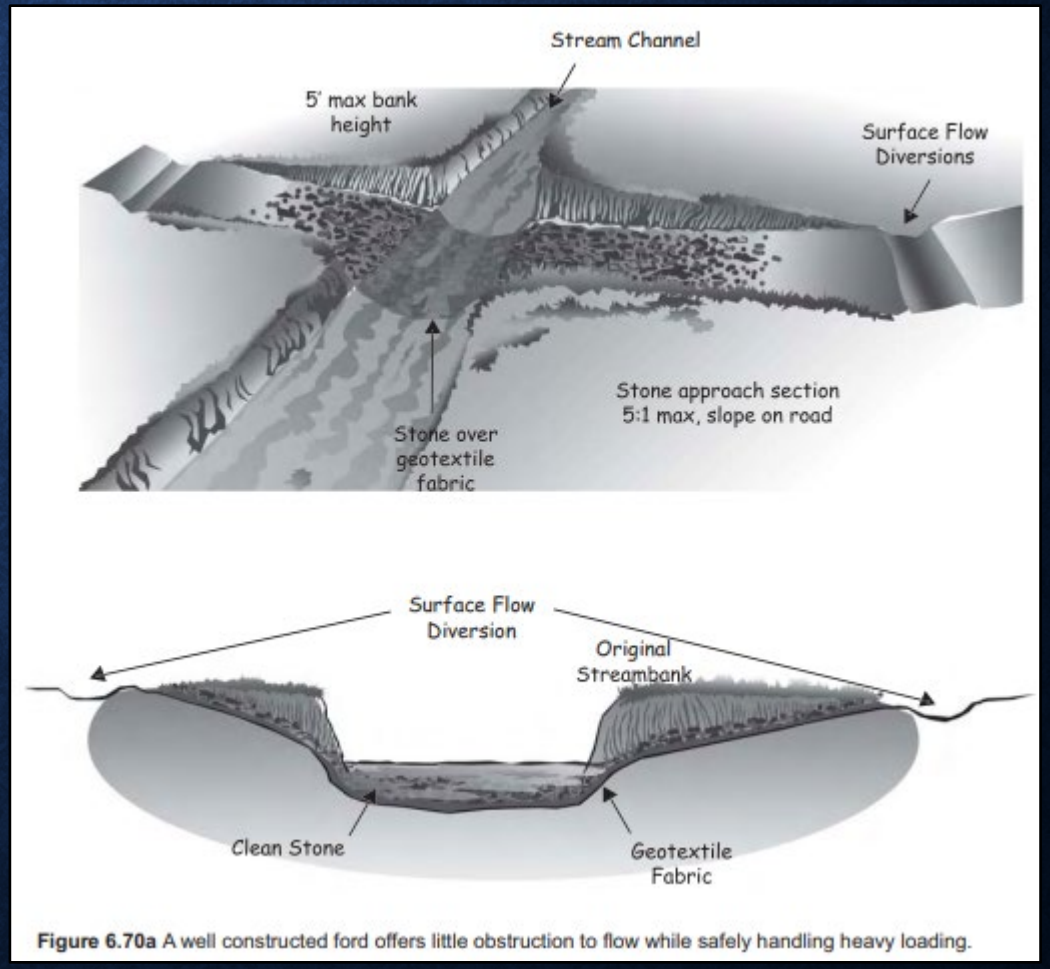


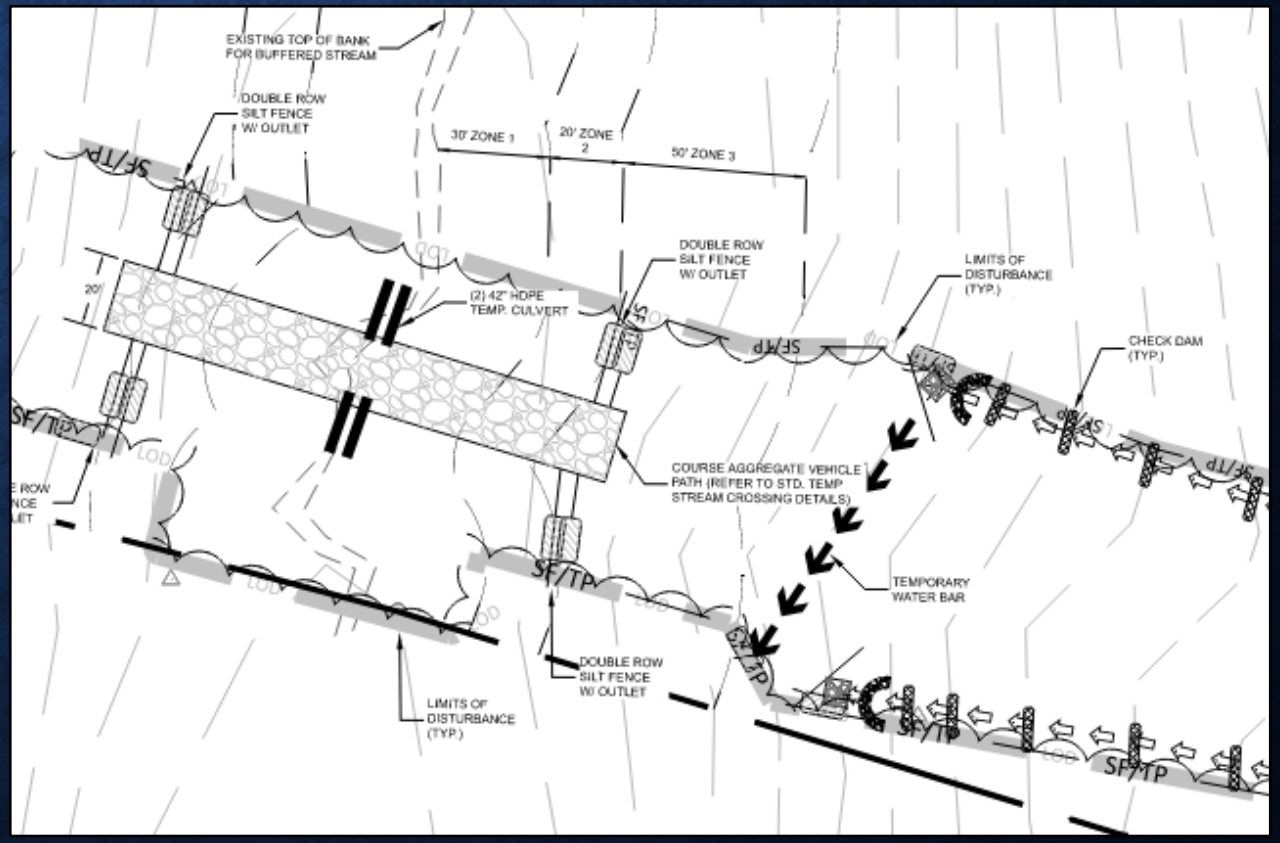
Figure 6.70a A well constructed ford offers little obstruction to flow while safely handling heavy loading.

DESIGN STANDARDS

TEMPORARY STREAM CROSSING

Criteria

- Anticipated life = 1 year
- Minimum design: Pass bankfull flow or peak flow from 2-yr storm (10-25 yr. recommended)
- Consider overflow areas for larger storms
- Design flow velocity non-erosive for receiving stream
- Design other EC measures associated with stream crossing to 10-year peak storm runoff

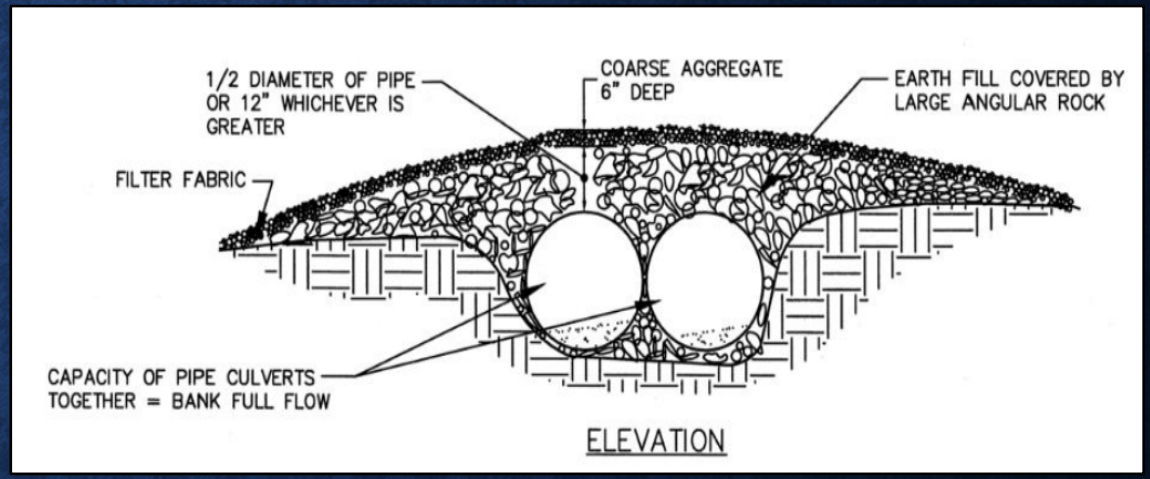


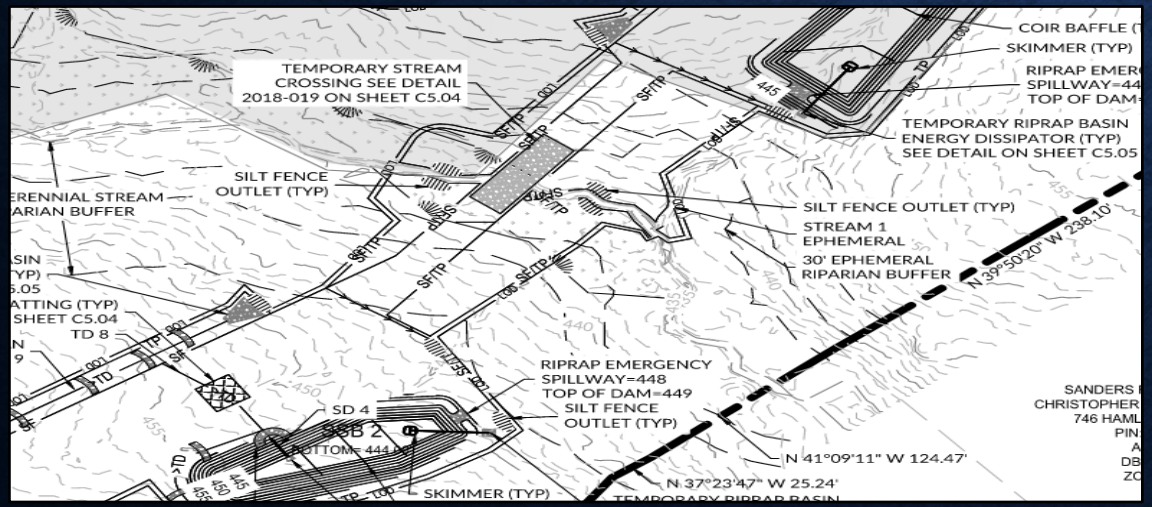
DESIGN STANDARDS

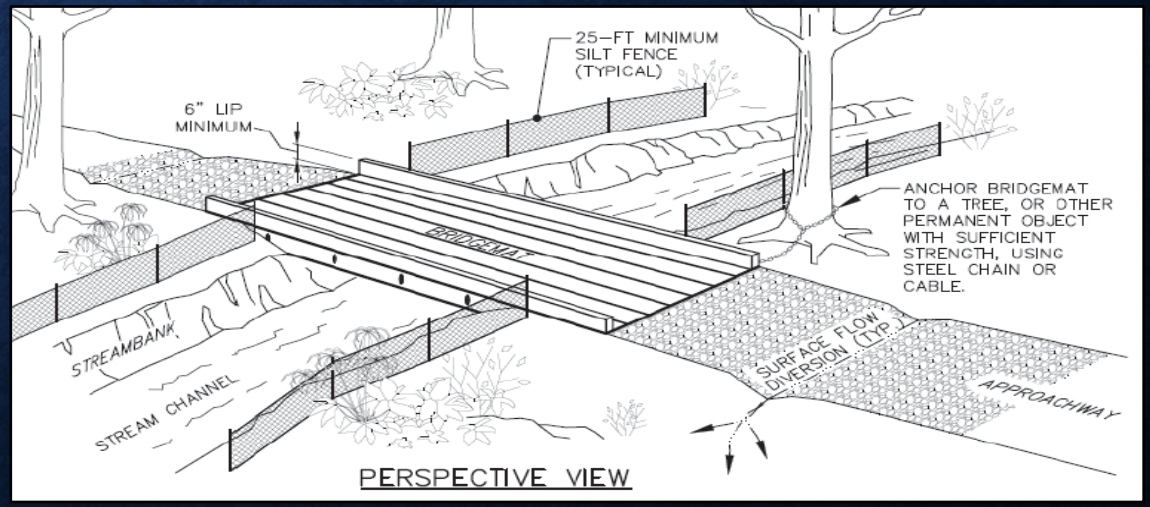
TEMPORARY STREAM CROSSING

Criteria

- Silt fence at four corners
- Coarse aggregate approachways
- Lip to prevent sedimentation to stream
- Divert surface water







DESIGN STANDARDS

PERMANENT STREAM CROSSING

Planning Considerations

- Locate in higher, better drained sections of stream to minimize flooding
- Permanent protection measures where road water enters stream to prevent erosion
- Stream section at crossing protected from erosion due to flood flows

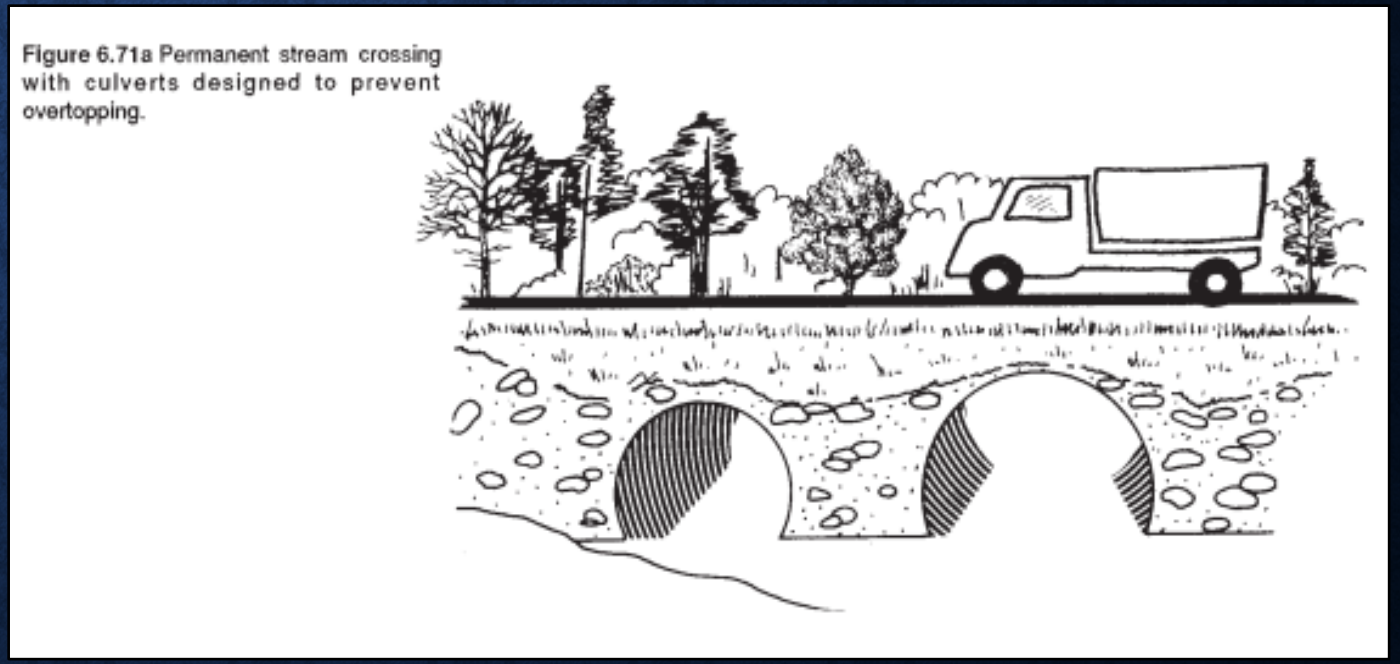
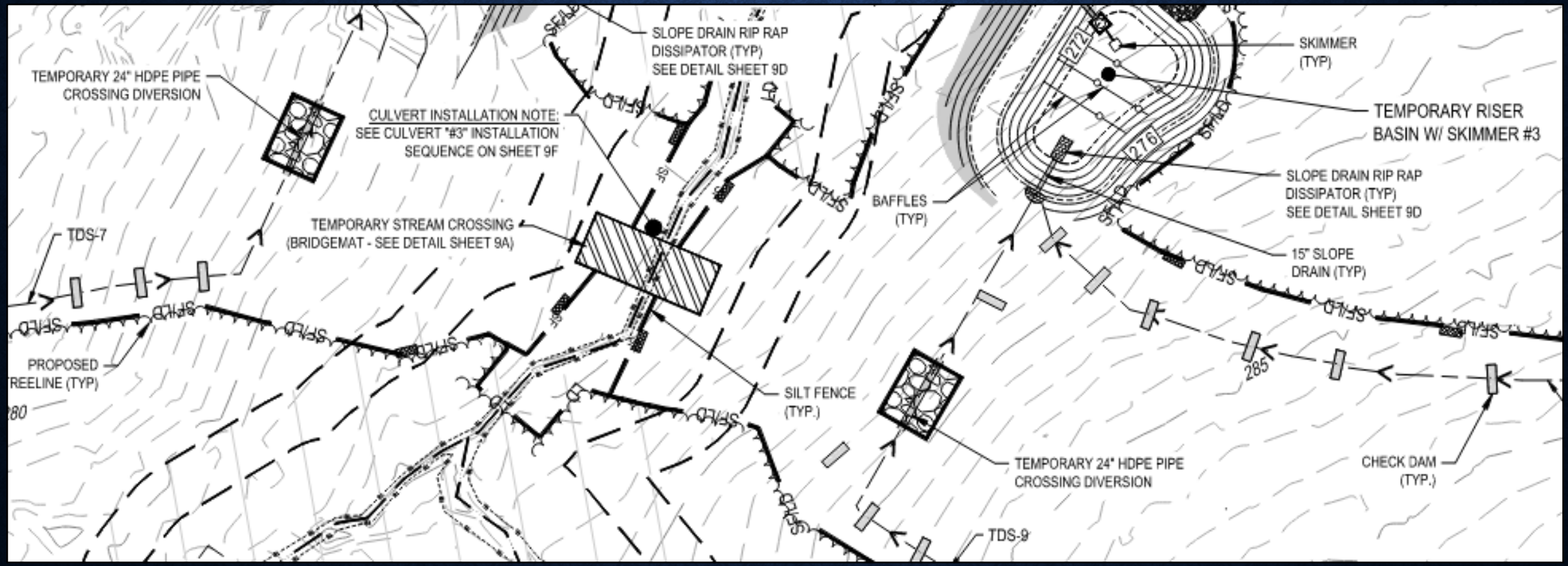


Figure 6.71a Permanent stream crossing with culverts designed to prevent overtopping.

DESIGN STANDARDS

STREAM CROSSINGS – EXAMPLE 1 (PUMP AROUND)



CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

STREAM CROSSINGS –EXAMPLE 1 (PUMP AROUND)

DESIGN STANDARDS

STREAM CROSSINGS – EXAMPLE 1 (PUMP AROUND)

CHANNNEL IMPACT SEQUENCE

GENERAL: WITH STAGE 1 CONSTRUCTION, CROSS STREAM WITH BRIDGEMAT TO ACCESS REMAINDER OF SITE AND INSTALL INITIAL TEMPORARY EROSION CONTROL MEASURES. SILT FENCE TO BE INSTALLED OUTSIDE OF TOP OF BANKS OF STREAM WITH REINFORCED SILT FENCE OUTLETS AS SHOWN.

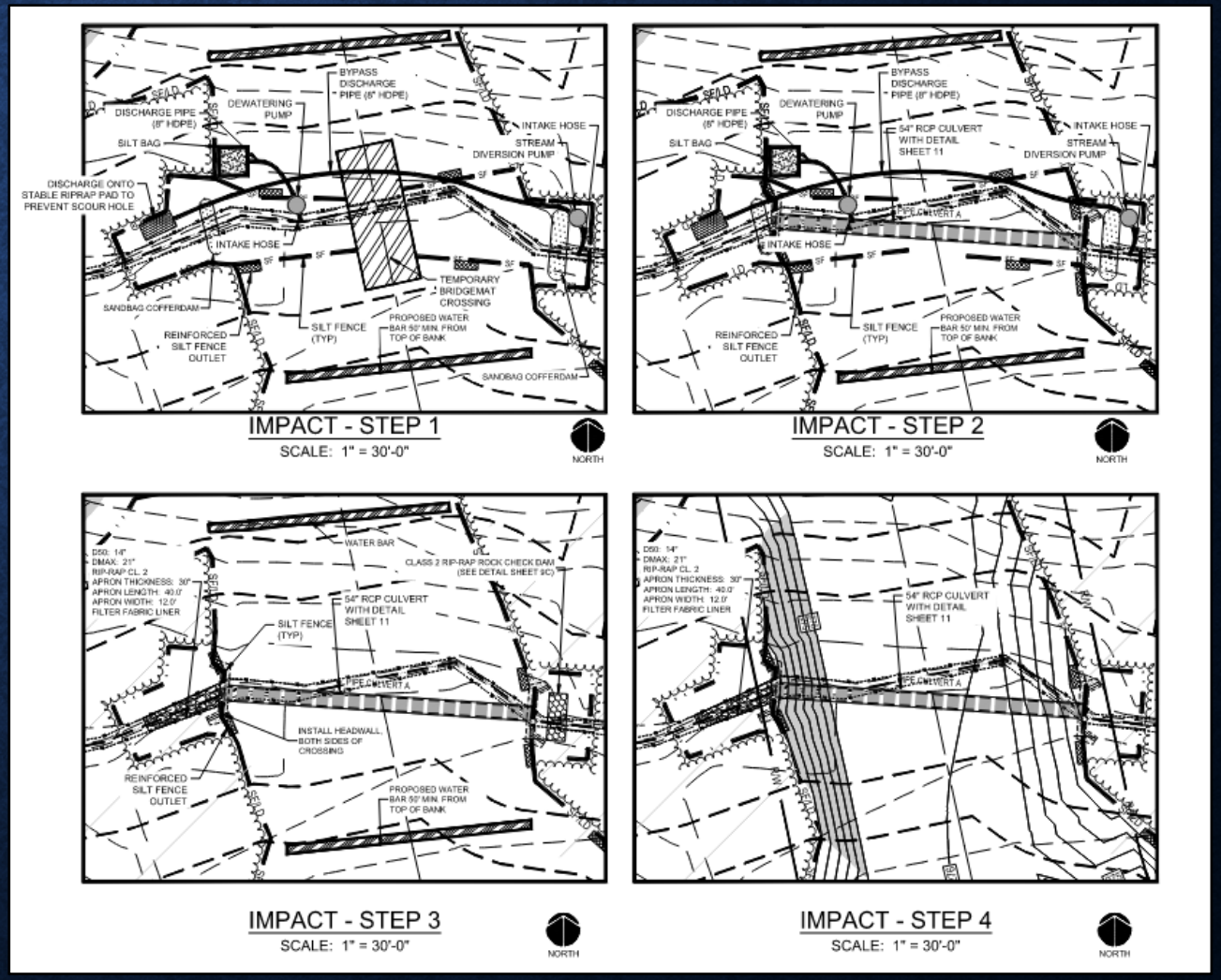
THE CONTRACTOR SHALL NOT IMPACT THE STREAM UNTIL THE CULVERT AND HEADWALLS HAVE BEEN DELEIVERED ON-SITE AND READY FOR INSTALLATION. WORK WITHIN THE STREAM SHOULD ONLY BE UNDERTAKEN WITH THE EXPECTATION OF 4-5 DAYS OF DRY WEATHER AS FORECASTED BY NWS.

STEP 1: AFTER UPSTREAM DIVERSIONS ARE FUNCTIONING; INSTALL WATER BARS (DIVERSION) AS SHOWN. NO ACTIVITY ALLOWED WITHIN STREAM CHANNEL. LAY 8" FUSED HDPE BYPASS DISCHARGE PIPE ON TOP OF GROUND AND POSITION STREAM DIVERSION PUMP UPSTREAM OF COFFER DAM. INSTALL SILT BAG AT DOWNSTREAM END OF 8" HDPE BYPASS DISCHARGE PIPE (OUTSIDE TOP OF BANK) INSTALL UPSTREAM AND DOWNSTREAM SANDBAG COFFER DAMS. CLEARING ONLY AS NECESSARY WITHIN THE STREAM AND NORTHERN TOP OF BANK TO INSTALL COFFER DAM AND DOWNSTREAM CLASS II RIP RAP DISSIPATOR. ACTIVATE BYPASS PUMPING SYSTEM.

STEP 2: WHILE MAINTAINING BYPASS PUMPING SYSTEM, EXCAVATE CHANNEL FOR CULVERT PIPE STARTING FROM DOWNSTREAM END. PLACE ON A 4,000 PSI CONCRETE MUD SILL AS DIRECTED BY GEOTECHNICAL ENGINEER. EXCAVATE GRADE 4' BEYOND OUTSIDE EDGE OF RCP ON EACH SIDE TO ALLOW ADEQUATE WIDTH FOR RECOMPACTION. INSTALL RCP STARTING FROM DOWNSTREAM END THEN HEADWALLS. UTILIZE EARTHEN MATERIAL STOCKPILED AS SELECT BACKFILL TO PIPE SPRINGLINE (APPROVED BY GEOTECHNICAL ENGINEER). INSTALL RIP RAP DISSIPATOR. IMPACT NORTHERN CHANNEL TOP OF BANK AND BEYOND ONLY AS NECESSARY TO INSTALL PIPE AND HEADWALL.

STEP 3: AFTER PIPE AND HEADWALLS ARE COMPLETE AND BACKFILLED; INSTALL SILT FENCING ALONG HEADWALL AND ON NORTH SIDE OF EXISTING CHANNEL BANK AS SHOWN WITH REINFORCED SILT FENCE OUTLETS. REMOVE UPPER COFFER DAM AND REPLACE WITH CLASS II RIP RAP FILTER WITH WASH STONE FACE (ROCK CHECK DAM WITH CLASS II RIP RAP - SEE DETAIL SHEET 9C).

STEP 4: AFTER TEMPORARY GROUND STABILIZATION IS ACHIEVED; REMOVE UPSTREAM RIP RAP FILTERS AND MAINTAIN SILT FENCE AT TOE OF SLOPES AND ALONG HEADWALLS.



CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

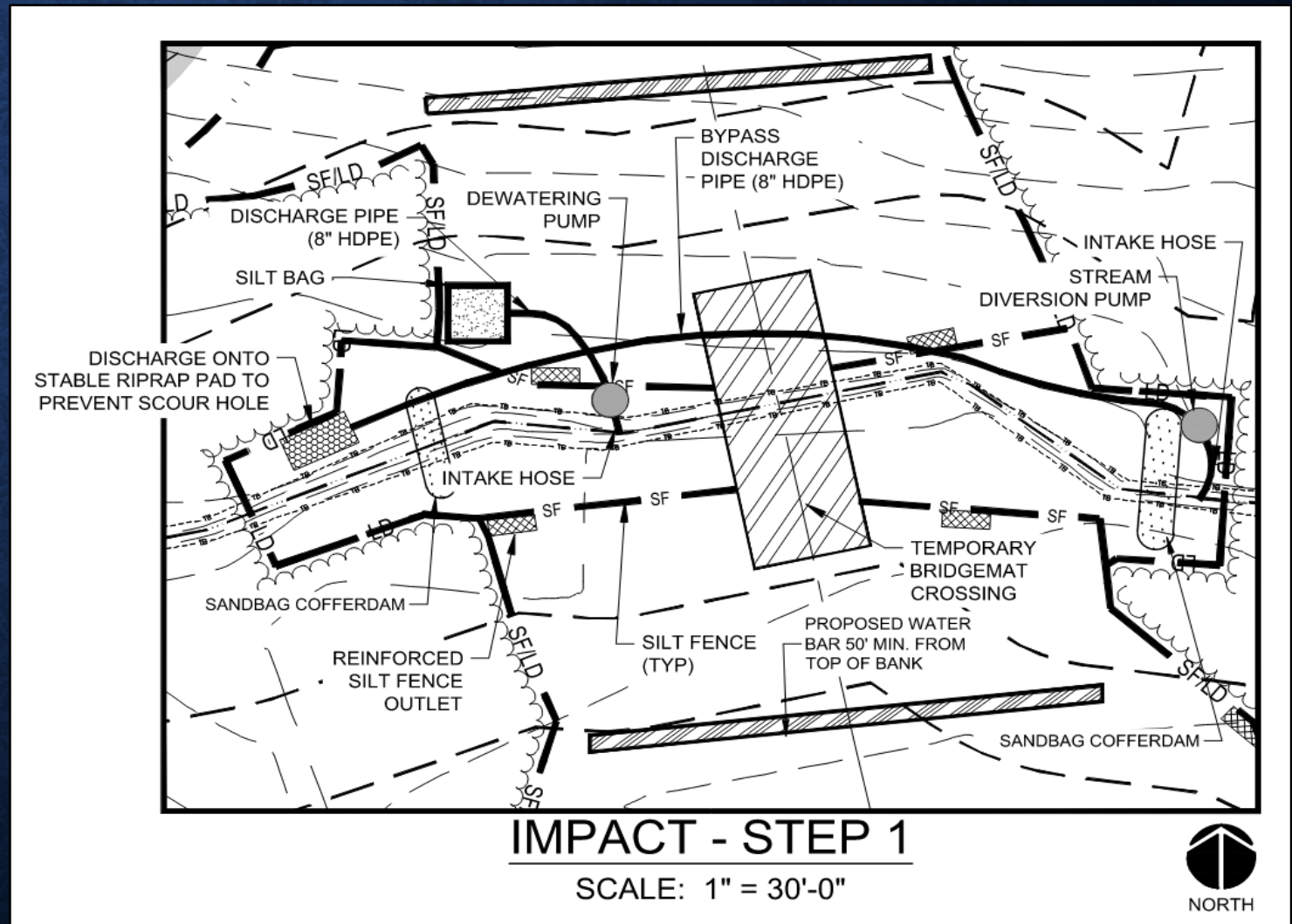
STREAM CROSSINGS – EXAMPLE 1 (PUMP AROUND)

CHANNNEL IMPACT SEQUENCE

GENERAL: WITH STAGE 1 CONSTRUCTION, CROSS STREAM WITH BRIDGEMAT TO ACCESS REMAINDER OF SITE AND INSTALL INITIAL TEMPORARY EROSION CONTROL MEASURES. SILT FENCE TO BE INSTALLED OUTSIDE OF TOP OF BANKS OF STREAM WITH REINFORCED SILT FENCE OUTLETS AS SHOWN.

THE CONTRACTOR SHALL NOT IMPACT THE STREAM UNTIL THE CULVERT AND HEADWALLS HAVE BEEN DELEIVERED ON-SITE AND READY FOR INSTALLATION. WORK WITHIN THE STREAM SHOULD ONLY BE UNDERTAKEN WITH THE EXPECTATION OF 4-5 DAYS OF DRY WEATHER AS FORECASTED BY NWS.

STEP 1: AFTER UPSTREAM DIVERSIONS ARE FUNCTIONING; INSTALL WATER BARS (DIVERSION) AS SHOWN. NO ACTIVITY ALLOWED WITHIN STREAM CHANNEL. LAY 8" FUSED HDPE BYPASS DISCHARGE PIPE ON TOP OF GROUND AND POSITION STREAM DIVERSION PUMP UPSTREAM OF COFFER DAM. INSTALL SILT BAG AT DOWNSTREAM END OF 8" HDPE BYPASS DISCHARGE PIPE (OUTSIDE TOP OF BANK) INSTALL UPSTREAM AND DOWNSTREAM SANDBAG COFFER DAMS. CLEARING ONLY AS NECESSARY WITHIN THE STREAM AND NORTHERN TOP OF BANK TO INSTALL COFFER DAM AND DOWNSTREAM CLASS II RIP RAP DISSIPATOR. ACTIVATE BYPASS PUMPING SYSTEM.



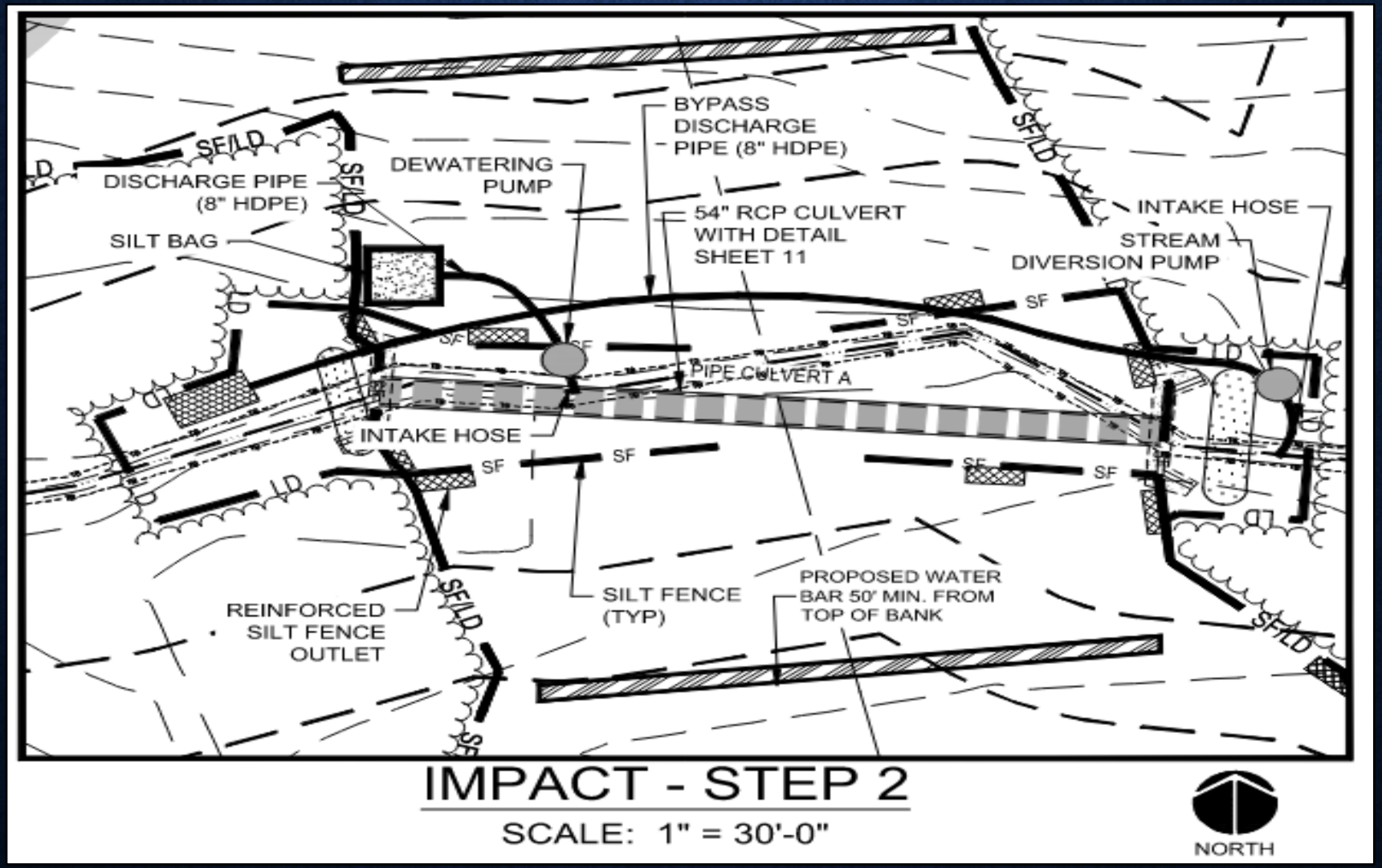
IMPACT - STEP 1

SCALE: 1" = 30'-0"

CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

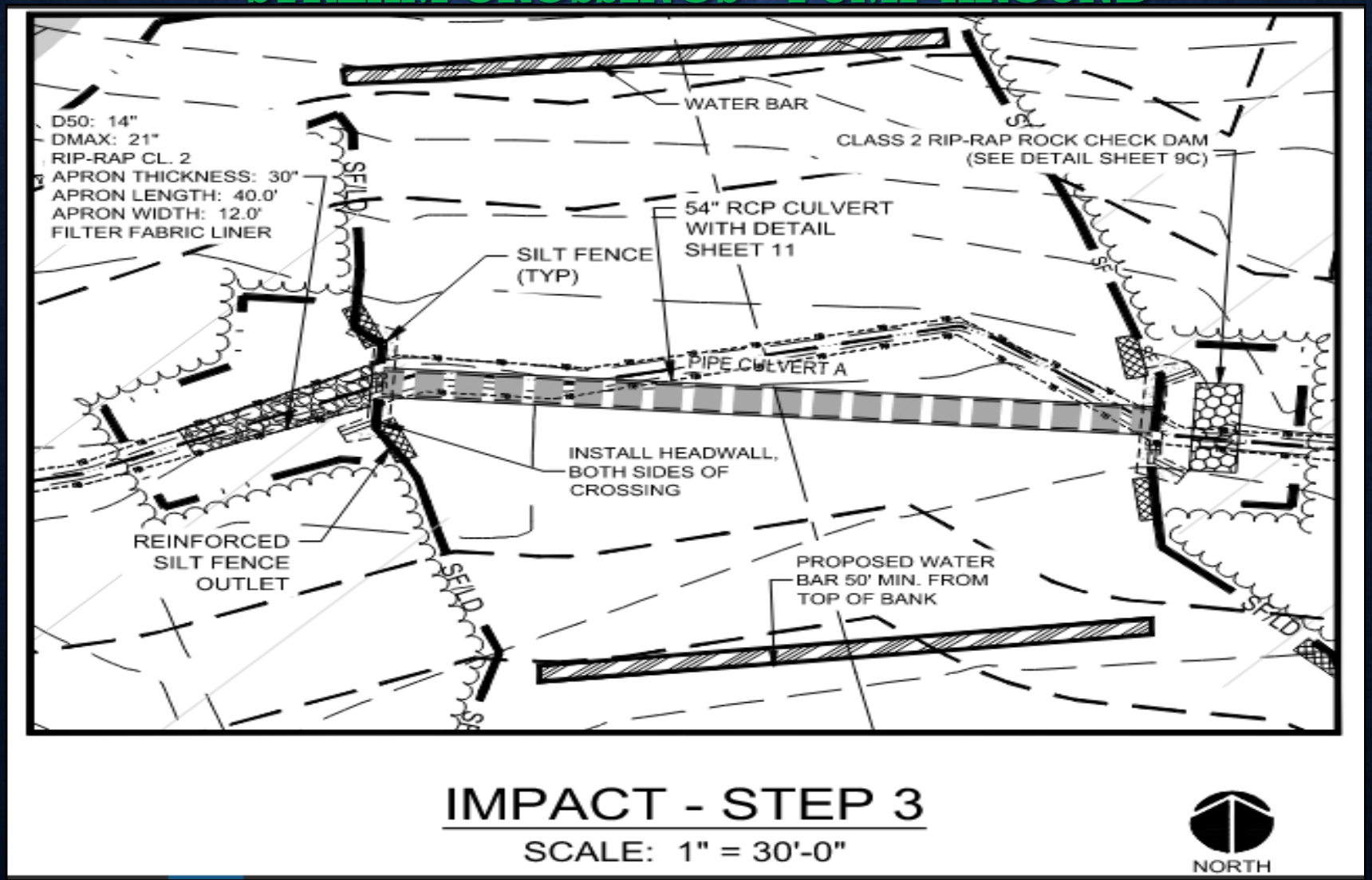
STREAM CROSSINGS – PUMP AROUND



CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

STREAM CROSSINGS – PUMP AROUND



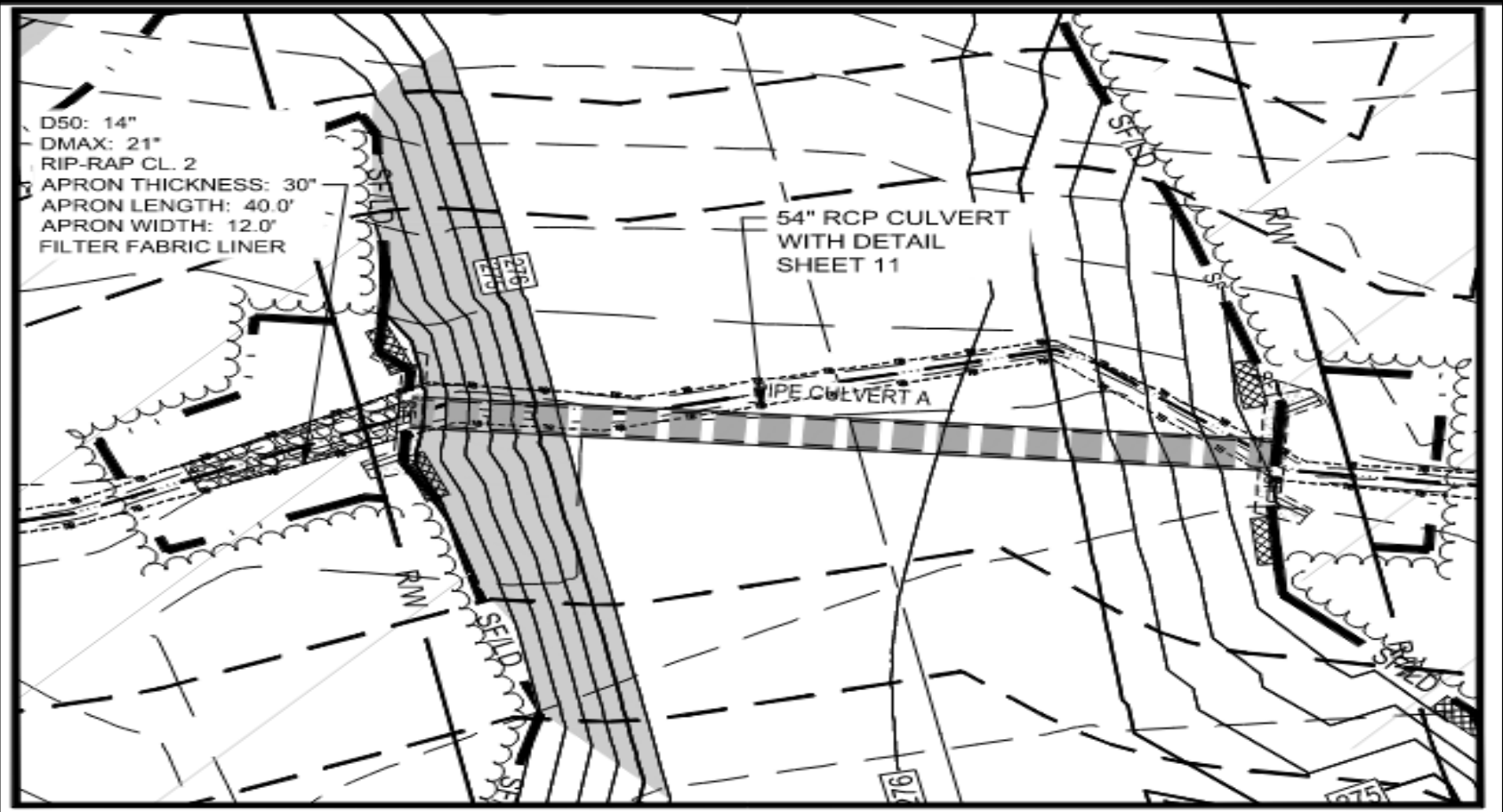
IMPACT - STEP 3

SCALE: 1" = 30'-0"

CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

STREAM CROSSINGS – PUMP AROUND



IMPACT - STEP 4

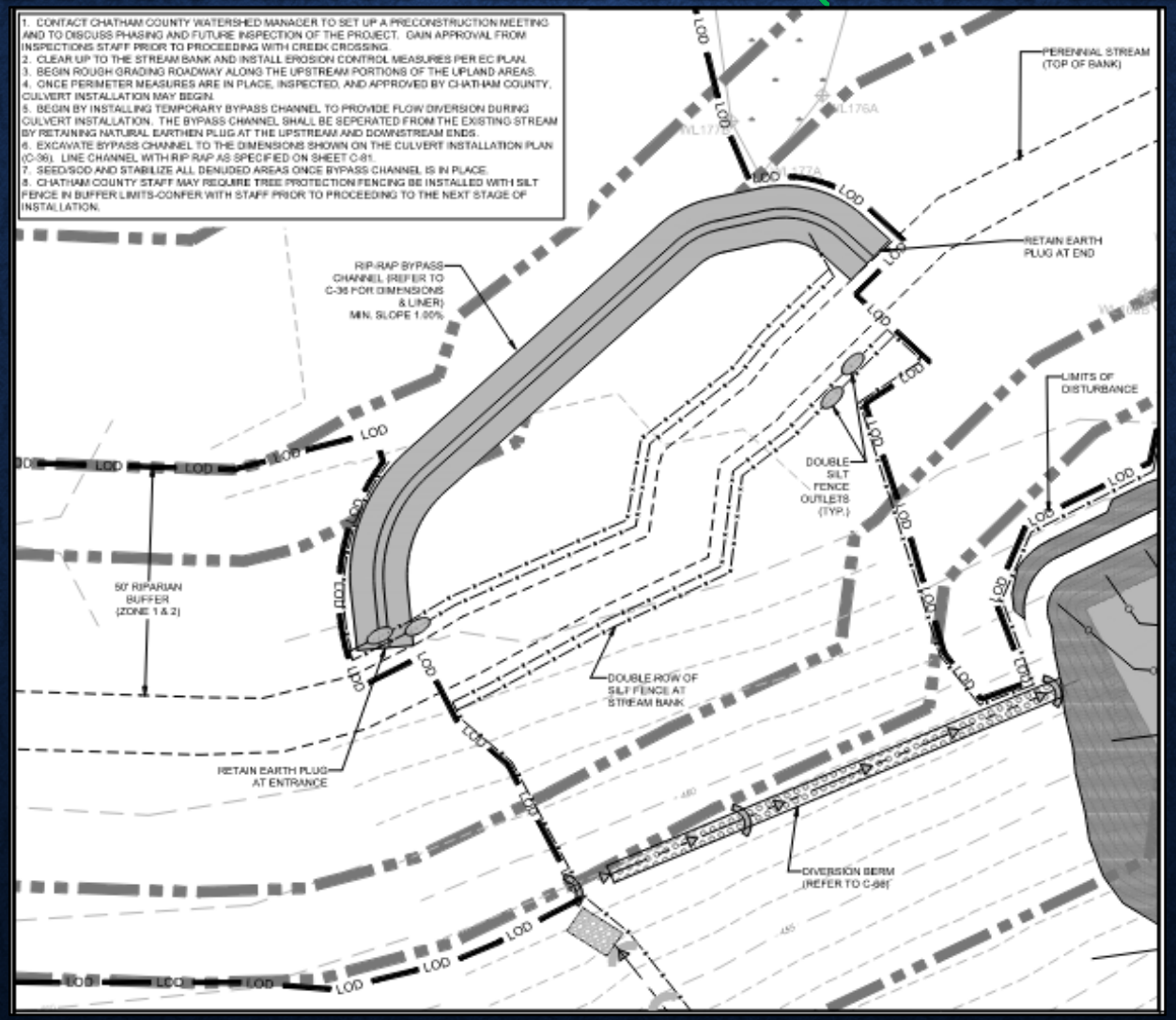
SCALE: 1" = 30'-0"

NORTH

CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

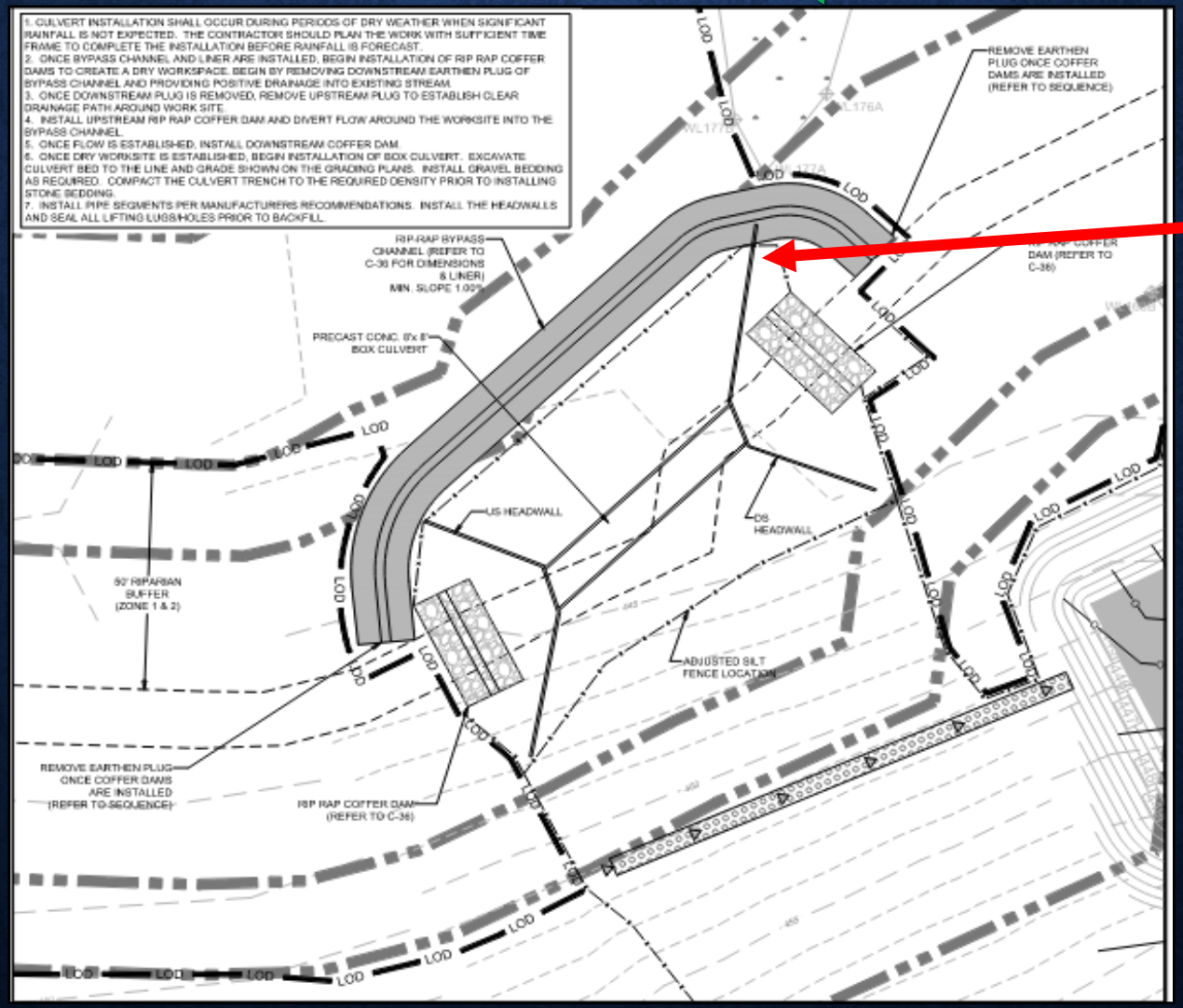
STREAM CROSSINGS – EXAMPLE 2 (BYPASS CHANNEL)



CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

STREAM CROSSINGS – EXAMPLE 2 (BYPASS CHANNEL)



DESIGN STANDARDS

CONSTRUCTION SEQUENCE

Detailed

- Instructs what to do and when
- Presented in stages
- Lists required inspections
- Instructs to clear only as necessary to install initial measures

EROSION CONTROL SEQUENCE - STAGE 1

1. OBTAIN GRADING PERMIT / FINAL APPROVAL FROM CHATHAM COUNTY WATERSHED PROTECTION DEPARTMENT.
2. CONTACT THE CHATHAM COUNTY WATERSHED PROTECTION DEPARTMENT TO SET UP A PRE-CONSTRUCTION MEETING PRIOR TO ANY LAND DISTURBANCE WORK PERFORMED.
3. THE CONTRACTOR SHALL KEEP A COPY OF THE APPROVED EROSION CONTROL PLANS ON SITE AT ALL TIMES.
4. DELINEATE THE PROPOSED TREELINE/DISTURBED LIMIT LINE AND INSTALL ALL PROPOSED SILT FENCE AND TREE PROTECTION FENCE THROUGHOUT THE ENTIRE PROJECT AREA ALONG WITH TEMPORARY CONSTRUCTION ENTRANCE. INSTALL CLEAN WATER DIVERSIONS / BERMS.
5. INSTALL TEMPORARY SILT FENCE OUTLETS IN ALL LOCATIONS AS SHOWN ON THE PLANS. FIELD LOCATE SILT FENCE OUTLETS AT APPROPRIATE LOW SPOTS AT THE SHOWN LOCATIONS.
6. ONCE THE PREVIOUS MEASURES ARE INSTALLED, CLEAR ONLY AS REQUIRED TO INSTALL TEMPORARY SKIMMER BASINS, TEMPORARY DIVERSION BERMS/ DITCHES, AND OTHER TEMPORARY MEASURES AS SHOWN ON THE APPROVED PLAN.
7. INSTALL CHECK DAMS AND TEMPORARY MATTING IN TEMPORARY DIVERSION DITCHES.
8. THE CONTRACTOR SHALL STABILIZE ALL DIVERSIONS, AND RISER/SKIMMER BASINS IMMEDIATELY UPON THEIR CONSTRUCTION.
9. ALL MEASURES SHALL BE INSTALLED AND INSPECTED FOR COMPLIANCE BY CHATHAM COUNTY WATERSHED PROTECTION DEPARTMENT PRIOR TO COMMENCEMENT OF ANY PROPOSED R.O.W. CLEARING/GRUBBING AND EXCAVATION. CALL FOR A INSPECTION FOR COMPLIANCE PRIOR TO ANY ADDITIONAL CLEARING. IF SITE IS APPROVED, PROCEED TO STAGE 2.

*CONTRACTOR TO REESTABLISH TEMPORARY DIVERSION SWALES AT THE END OF EACH DAY TO ENSURE DRAINAGE TO THE APPROPRIATE STRUCTURE.

DESIGN STANDARDS

CONSTRUCTION SEQUENCE

Thoughtful

- Explains transition between stages
- Includes total scope of work
- Clarifies any gray areas
- Define how long sediment basins remain
- Clearly state when conversion can occur
- Steps to close plan/permit

CONSTRUCTION SEQUENCE SCHEDULE

Definition A specified work schedule that coordinates the timing of land-disturbing activities and the installation of erosion and sedimentation control measures.

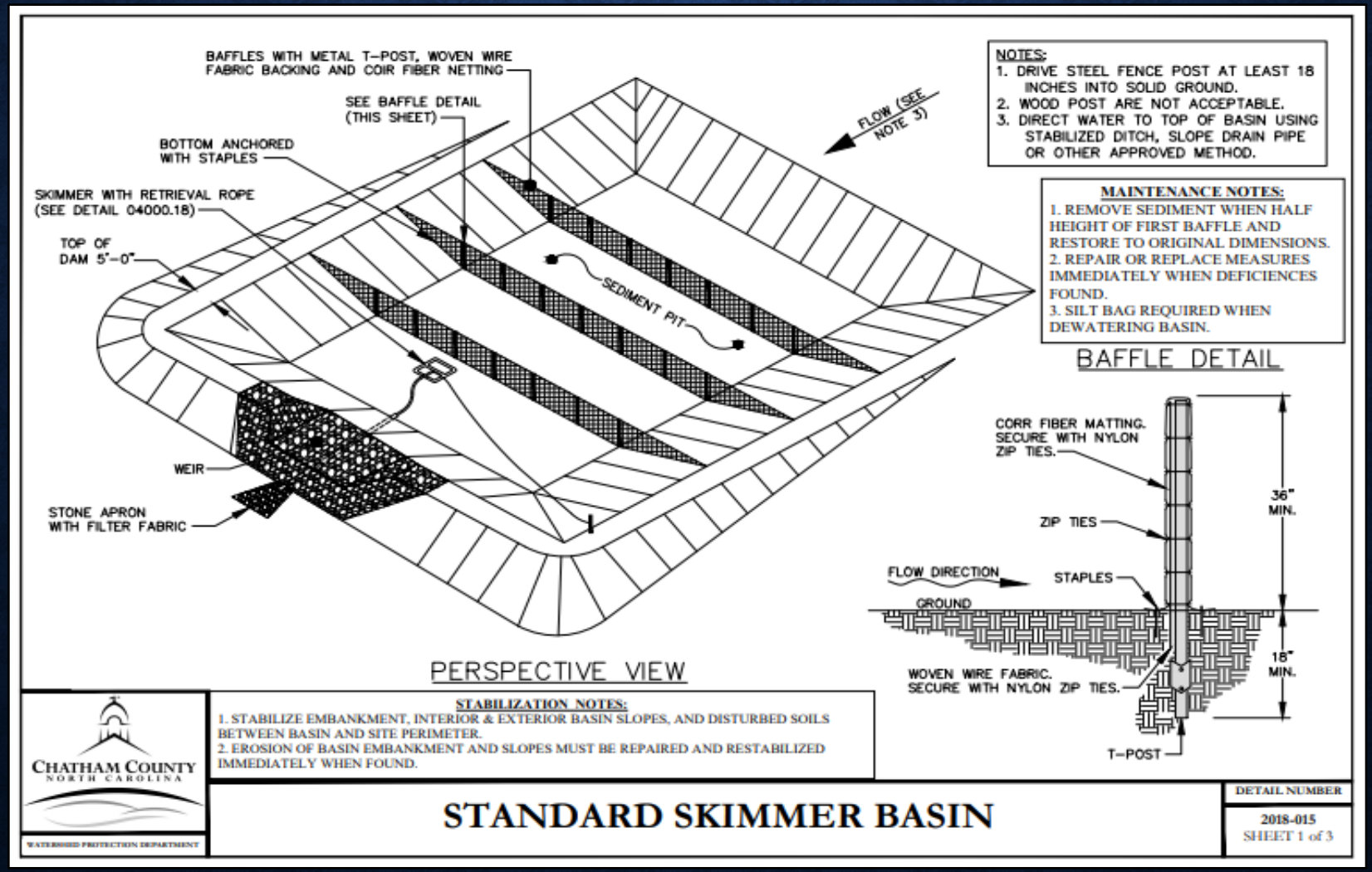
EROSION CONTROL SEQUENCE - STAGE 2

1. ONCE APPROVAL FOR PHASE 1 IS OBTAINED BEGIN CLEARING AND GRUBBING OF REMAINING DISTURBED AREAS AS SHOWN ON APPROVED PLAN.
2. SEE CULVERT #3 INSTALLATION SEQUENCE ON DETAIL SHEET 9F FOR STREAM CROSSING.
3. BEGIN INSTALLATION OF NEW STORM DRAINAGE NETWORKS AND SITE UTILITIES AS SITE IS BEING BROUGHT UP TO FINAL GRADE.
4. WHEN EXCAVATING FOR INSTALLATION OF STORM DRAINAGE NETWORKS, INSTALL FOREBAYS AT TEMPORARY RISER BASINS. SEE POND DETAIL SHEETS 6A-6D FOR DETAILS ON FOREBAYS.
5. CONSTRUCTION RUNOFF IN THE CULVERT F / STORM NETWORK G AREA TO BE DIRECTED TO TSB #3 AND TSB #4 FROM STAGE 1 DESIGN UNTIL CULVERT F IS FUNCTIONING AS CLEAN WATER BYPASS PIPE AND STAGE 2 RUNOFF DIRECTED TO TSB #4 IN STAGE 2 CONDITION.
6. ONCE THE PIPES FOR STORM SYSTEMS ARE COMPLETE, INSTALL PERMANENT DIVERSION DITCHES AND OTHER TEMPORARY MEASURES. INSTALL CHECK DAMS IN EACH AND STABILIZE WITH PERMANENT MATTING IMMEDIATELY.
7. COMPLETE THE INSTALLATION OF THE STORM DRAINAGE NETWORK AS THE SITE COMES TO FINAL GRADE. PLACE INLET PROTECTION AND HORSEHOE INLET PROTECTION AROUND STORM DRAINAGE STRUCTURES ONCE THEY ARE COMPLETED.
8. THE TEMPORARY SKIMMER BASINS INTERIOR TO THE SITE ARE TO BE REMOVED AND EVENTUALLY FILLED TO FINAL OR ORIGINAL EXISTING GRADE. CHATHAM COUNTY WATERSHED PROTECTION DEPARTMENT MUST INSPECT SITE CONDITIONS PRIOR TO REMOVAL OF TEMPORARY SKIMMER BASINS.
9. BRING SITE TO FINAL GRADE AND BEGIN EXCAVATION OF ROADWAYS.
10. CONSTRUCT CURB AND GUTTER AND STONE BASE TO PREP FOR PAVING. INSTALL SIDEWALKS. SEED/SOD AND INSTALL LANDSCAPING ALONG WITH ANY OTHER PERMANENT GROUND COVER.
11. SEED AND MULCH ALL DENUDED AREAS WITHIN 15 WORKING DAYS OF COMPLETION OF ANY PHASE OF CONSTRUCTION. EROSION CONTROL MATTING IS TO BE INSTALLED ON SLOPES 3:1 OR GREATER IMMEDIATELY AFTER SEEDING.
12. PAVE ROADS.
13. REQUEST FINAL APPROVAL BY CHATHAM COUNTY WATERSHED PROTECTION DEPARTMENT. IF THE INSPECTOR IS SATISFIED WITH UPSTREAM PERMANENT GROUND COVER, BEGIN REMOVING TEMPORARY EROSION CONTROL MEASURES.
14. AFTER STABILIZATION HAS OCCURRED REMOVE SEDIMENT FROM RISER BASIN/WATER QUALITY POND AND CONVERT TO PERMANENT STRUCTURE. CONTACT CHATHAM COUNTY WATERSHED PROTECTION DEPARTMENT FOR INSPECTION PRIOR TO BASIN CONVERSION. ALL WATER IS TO BE PUMPED TO SILT BAG BEFORE DISCHARGING FROM SITE (SEE DETAIL SHEET 9C). CONSTRUCTION RUNOFF FROM THE CONSERVANCY PHASE 1B WILL BE DIRECTED TO TRB #4. DO NOT COMPLETE FINAL CONVERSION UNTIL THAT AREA IS GRADED TO FINAL CONDITION AND STABILIZED.
15. REQUEST FINAL INSPECTION BY ENVIRONMENTAL INSPECTOR TO CLOSE OUR LAND-DISTURBING PERMIT

*CONTRACTOR TO REESTABLISH TEMPORARY DIVERSION SWALES AT THE END OF EACH DAY TO ENSURE DRAINAGE TO THE APPROPRIATE STRUCTURE.

DESIGN STANDARDS

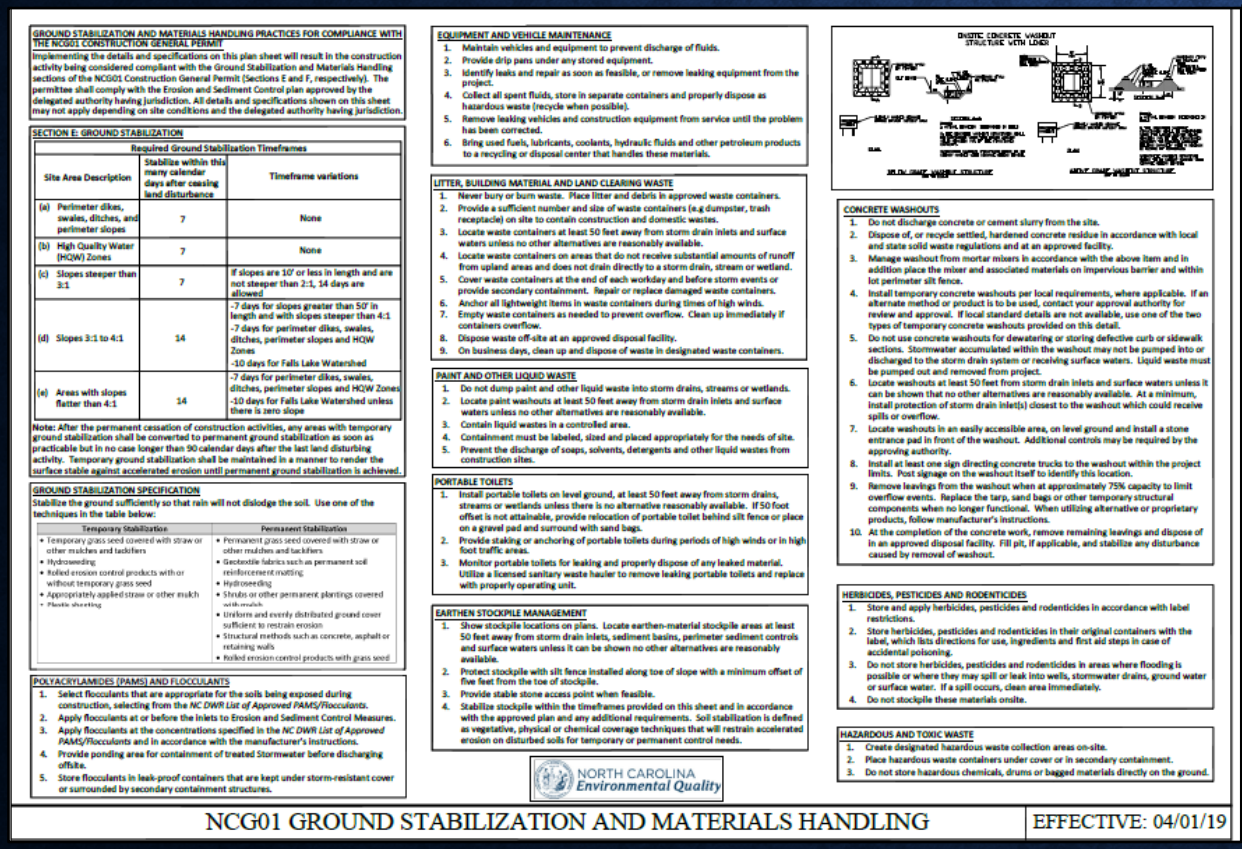
STANDARD DETAILS



CHATHAM COUNTY
NORTH CAROLINA

DESIGN STANDARDS

STANDARD DETAILS



GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Required Ground Stabilization Timeframes

Site Area Description	Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants.*
2. Apply flocculants at or before the Inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.

NORTH CAROLINA Environmental Quality

CONCRETE WASHOUTS

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

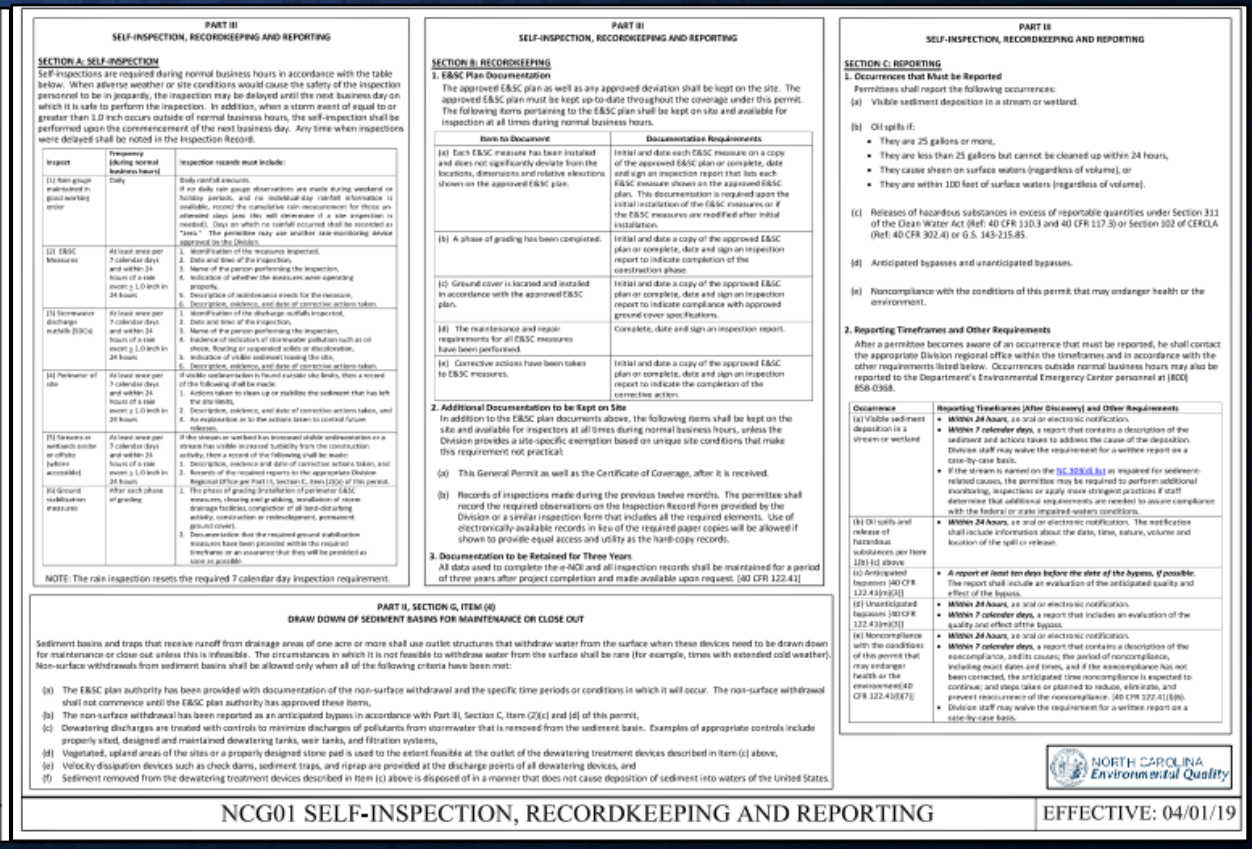
HERBICIDES, PESTICIDES AND RODENTICIDES

1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING | EFFECTIVE: 04/01/19



PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, record the cumulative rain measurement for those un-attended days (see this will demonstrate if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected. 2. Date and time of the inspection. 3. Name of the person performing the inspection. 4. Indication of whether the measures were operating properly. 5. Description of maintenance needs for the measure. 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected. 2. Date and time of the inspection. 3. Name of the person performing the inspection. 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration. 5. Indication of visible sediment leaving the site. 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits. 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (when accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be kept on site and available for inspection at all times during normal business hours.

Item to Document	Documentation Requirements
(a) Each E&SC measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC plan.	Initial and date each E&SC measure on a copy of the approved E&SC plan or complete, date and sign an inspection report that lists each E&SC measure shown on the approved E&SC plan. This documentation is required upon the initial installation of the E&SC measures or if the E&SC measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC plan.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC measures.	Initial and date a copy of the approved E&SC plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation to be Kept on Site

In addition to the E&SC plan documents above, the following items shall be kept on the site and available for inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This General Permit as well as the Certificate of Coverage, after it is received.

(b) Records of inspections made during the previous twelve months. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

3. Documentation to be Retained for Three Years

All data used to complete the e-NOI and all inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART II, SECTION G, ITEM (4)
DRAW DOWN OF SEDIMENT BASINS FOR MAINTENANCE OR CLOSE OUT

Sediment basins and traps that receive runoff from drainage areas of one acre or more shall use outlet structures that withdraw water from the surface when these devices need to be drawn down for maintenance or close out unless this is infeasible. The circumstances in which it is not feasible to withdraw water from the surface shall be rare (for example, times with extended cold weather). Non-surface withdrawals from sediment basins shall be allowed only when all of the following criteria have been met:

(a) The E&SC plan authority has been provided with documentation of the non-surface withdrawal and the specific time periods or conditions in which it will occur. The non-surface withdrawal shall not commence until the E&SC plan authority has approved these items,
(b) The non-surface withdrawal has been reported as an anticipated bypass in accordance with Part III, Section C, Item (2)(c) and (d) of this permit,
(c) Dewatering discharges are treated with controls to minimize discharges of pollutants from stormwater that is removed from the sediment basin. Examples of appropriate controls include properly sited, designed and maintained dewatering tanks, weir tanks, and filtration systems,
(d) Vegetated, upland areas of the sites or a properly designed stone pad is used to the extent feasible at the outlet of the dewatering treatment devices described in Item (c) above,
(e) Velocity dissipation devices such as check dams, sediment traps, and riprap are provided at the discharge points of all dewatering devices, and
(f) Sediment removed from the dewatering treatment devices described in Item (c) above is disposed of in a manner that does not cause deposition of sediment into waters of the United States.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that Must be Reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(c) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(d) Anticipated bypasses and unanticipated bypasses.

(e) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Department's Environmental Emergency Center personnel at (800) 858-0368.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days,*** a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours***, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	• ***A report at least ten days before the date of the bypass, if possible.*** The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days,*** a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment[40 CFR 122.41(l)(7)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days,*** a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6)]. • Division staff may waive the requirement for a written report on a case-by-case basis.

NORTH CAROLINA Environmental Quality

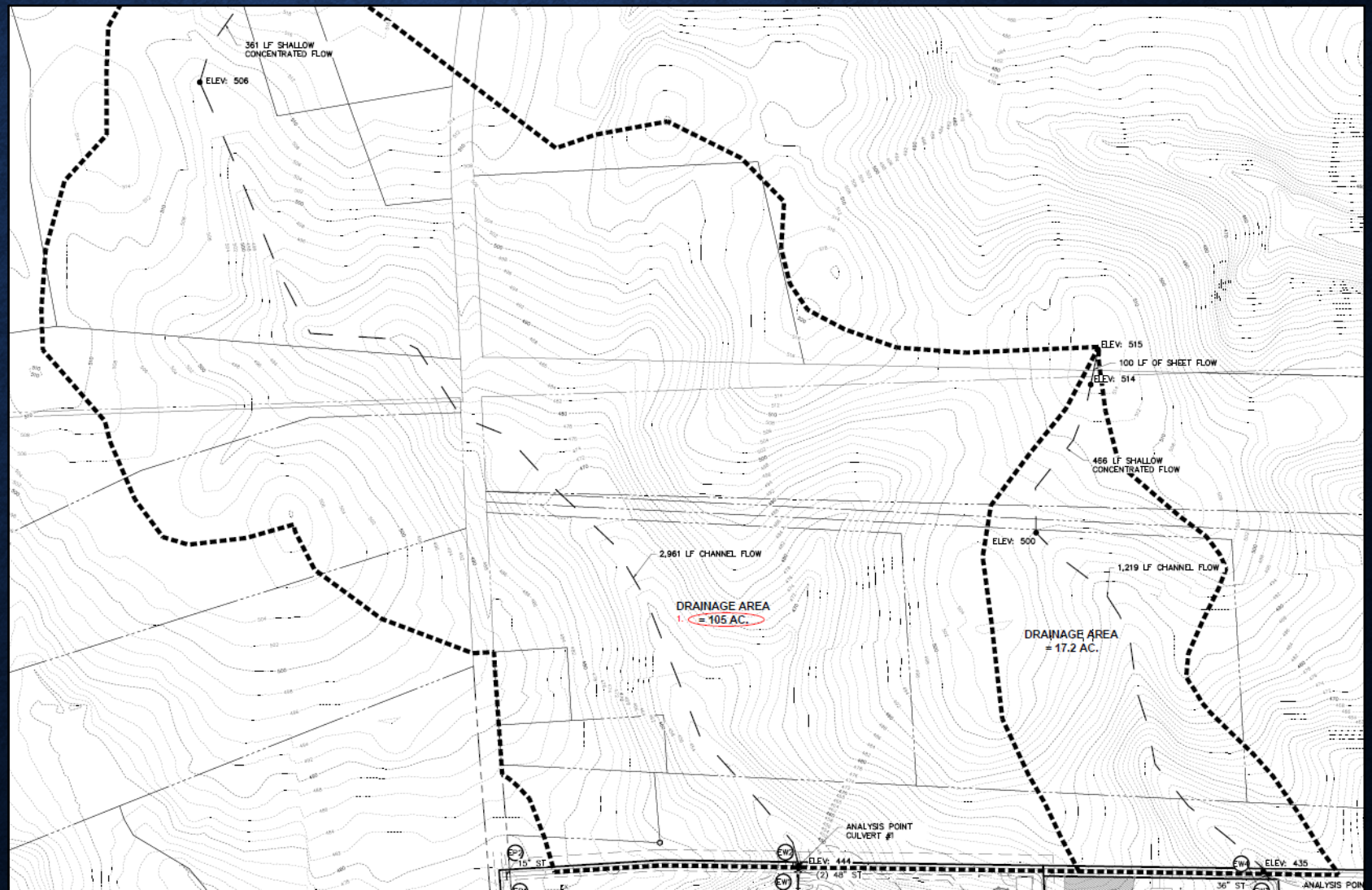
NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING | EFFECTIVE: 04/01/19

Include in all erosion control plans subject to NCG01.

DESIGN STANDARDS

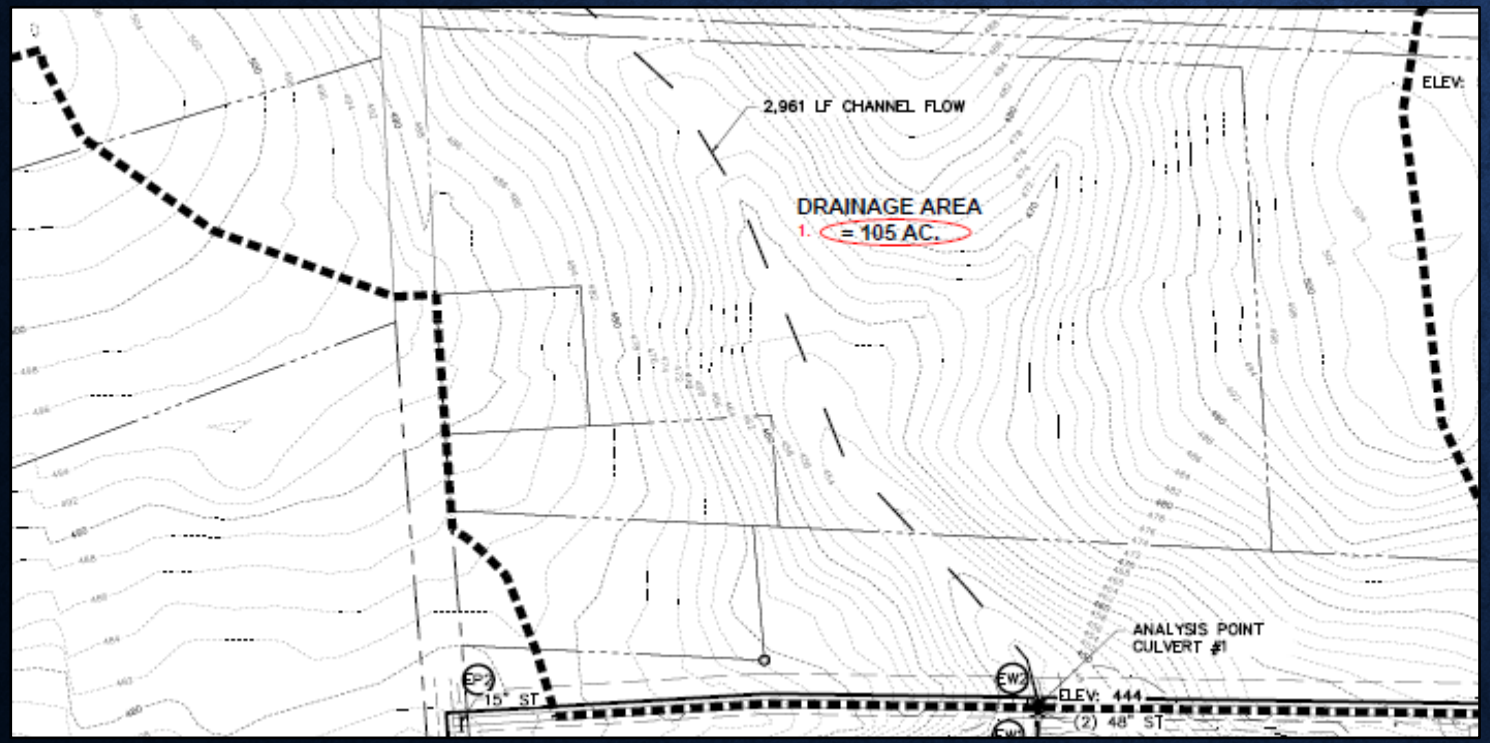
STORM DRAINAGE INFRASTRUCTURE - CULVERTS

- Verify design
- Verify inputs
- Check for overtopping



DESIGN STANDARDS

STORM DRAINAGE INFRASTRUCTURE - CULVERTS



Summary for Subcatchment D1: DA to Culvert 1

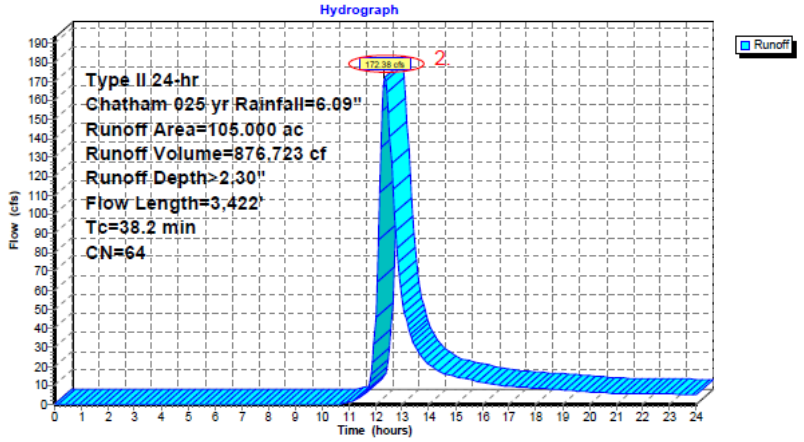
Runoff = 2. 172.38 cfs @ 12.36 hrs, Volume= 876,723 cf, Depth> 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Chatham 025 yr Rainfall=6.09" 2.

Area (ac)	CN	Description
67.000	60	Woods, Fair, HSG B
2.000	98	Roofs, HSG B
36.000	69	Pasture/grassland/range, Fair, HSG B
1. 105.000	64	Weighted Average
103.000		98.10% Pervious Area
2.000		1.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.7	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.60"
6.1	361	0.0388	0.98		**Shallow Concentrated Flow, Shallow Concentrated Flow** Woodland Kv= 5.0 fps
5.4	2,961	0.0209	9.22	92.18	**Channel Flow, Channel Flow** Area= 10.0 sf Perim= 9.0' r= 1.11' n= 0.025 Earth, clean & winding
38.2	3,422	Total			

Subcatchment D1: DA to Culvert 1



DESIGN STANDARDS

STORM DRAINAGE INFRASTRUCTURE - CULVERTS

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. — Wednesday, Feb 16 2022

Culvert 1 - 25 Year

Invert Elev Dn (ft)	= 442.50
Pipe Length (ft)	= 23.70
Slope (%)	= 2.53
Invert Elev Up (ft)	= 443.10
Rise (in)	= 48.0
Shape	= Circular
Span (in)	= 48.0 (3.)
No. Barrels	= 2 (3.)
n-Value	= 0.013
Culvert Type	= Circular Concrete (3.)
Culvert Entrance	= Groove end w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0018, 2, 0.0292, 0.74, 0.2

Embankment

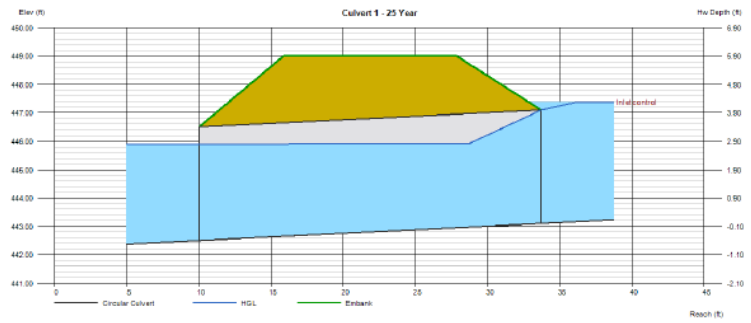
Top Elevation (ft)	= 449.00 (4.)
Top Width (ft)	= 12.00
Crest Width (ft)	= 20.00

Calculations

Qmin (cfs)	= 172.38
Qmax (cfs)	= 172.38
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 172.38 (2.)
Qpipe (cfs)	= 172.38
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 7.56
Veloc Up (ft/s)	= 9.13
HGL Dn (ft)	= 445.91
HGL Up (ft)	= 445.91
Hw Elev (ft)	= 447.38 (4.)
Hw/D (ft)	= 1.07
Flow Regime	= Inlet Control



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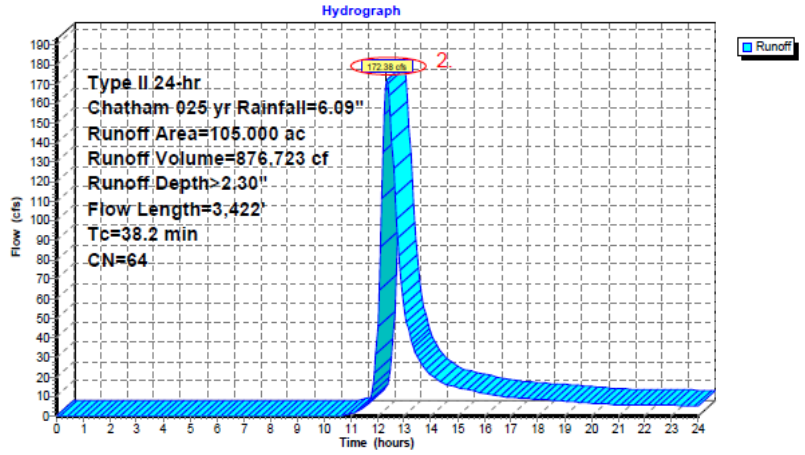
Subcatchment D1: DA to Culvert 1



DESIGN STANDARDS

STORM DRAINAGE INFRASTRUCTURE – INLET REPORTS

- Verify design
- Verify inputs
- Check for capacity

Q25-YEAR Report

Stormwater Studio 2024 v 3.0.0.35

Project Name: STORM SYSTEM B

11-11-2024

Line No.	Inlet ID	Drain Area (ac)	Total Area (ac)	Runoff Coeff (C)	Total C x A	Inlet Time (min)	Tc System (min)	i Inlet (in/hr)	Incr Q (cfs)	Total Runoff (cfs)	Capac. Full (cfs)	Vel Ave (ft/s)	Line Size (in)	Line Length (ft)	Line Slope (%)	Invert Up (ft)	Invert Dn (ft)	Grnd/Rim Elev Up (ft)
1	B1	4.580	6.930	0.60	4.16	5.0	5.3	7.95	21.85	32.60	46.66	6.64	30	197.00	1.29	290.55	288.00	295.60
2	B2	2.350	2.350	0.60	1.41	5.0	5.0	7.95	11.21	11.21	16.41	3.57	24	104.48	0.53	291.60	291.05	296.05
3	E1	0.900	1.640	0.60	0.98	5.0	5.3	7.95	4.29	7.72	16.28	4.44	18	52.00	2.40	272.75	271.50	276.80
4	E2	0.740	0.740	0.60	0.44	5.0	5.0	7.95	3.53	3.53	7.50	2.21	18	72.20	0.51	273.32	272.95	277.05
5	C1	2.980	5.870	0.60	3.52	5.0	5.2	7.95	14.22	27.73	71.69	6.00	30	36.00	3.06	270.60	269.50	275.40
6	C2	2.890	2.890	0.60	1.73	5.0	5.0	7.95	13.79	13.79	16.41	4.45	24	76.00	0.53	271.50	271.10	275.40
7	F1	9.010	9.010	0.35	3.15	5.0	5.0	7.95	25.08	25.08	49.73	6.14	30	204.00	1.47	279.00	276.00	286.65
8	G1	1.200	5.570	0.60	3.34	5.0	5.5	7.95	5.73	26.01	31.15	8.53	24	58.00	1.90	275.10	274.00	283.45
9	G2	2.940	3.620	0.60	2.17	5.0	5.3	7.95	14.03	17.04	14.89	9.64	18	102.00	2.01	277.75	275.70	283.45
10	G3	0.680	0.680	0.60	0.41	5.0	5.0	7.95	3.24	3.24	4.58	2.81	15	72.00	0.50	282.86	282.50	284.94
11	G4	0.750	0.750	0.60	0.45	5.0	5.0	7.95	3.58	3.58	6.41	2.11	18	72.00	0.37	281.72	281.45	284.51
12	I1	3.360	18.960	0.60	8.47	5.0	5.5	7.95	16.03	65.97	136.02	17.22	30	50.00	11.00	273.00	267.50	277.34
13	CB I2	0.130	14.630	0.60	5.87	5.0	5.3	7.95	0.62	46.03	41.53	9.38	30	78.00	1.03	274.30	273.50	279.57
14	I3	5.320	14.500	0.45	5.80	5.0	5.3	7.95	19.04	45.49	65.95	9.27	30	29.00	2.59	275.25	274.50	280.50
15	I4	5.940	5.940	0.30	1.78	5.0	5.0	7.95	14.17	14.17	22.91	4.51	24	38.00	1.03	276.14	275.75	280.01
16	CB J1	0.040	2.380	0.60	1.43	5.0	5.1	7.95	0.19	11.29	48.34	8.25	24	81.00	4.57	271.20	267.50	278.84
17	CB J2	0.040	2.340	0.60	1.40	5.0	5.1	7.95	0.19	11.13	23.08	5.99	24	24.00	1.04	271.65	271.40	278.84
18	FES J3	2.300	2.300	0.60	1.38	5.0	5.0	7.95	10.97	10.97	15.62	7.67	18	38.43	2.21	273.00	272.15	277.93
19	K1	2.340	5.870	0.60	3.52	5.0	5.3	7.95	11.16	27.66	66.43	12.60	24	51.00	8.63	277.40	273.00	282.10
20	K2	3.530	3.530	0.60	2.12	5.0	5.0	7.95	16.84	16.84	17.30	5.36	24	102.58	0.58	278.20	277.60	282.10
21	L1	1.420	4.680	0.60	2.81	5.0	5.2	7.95	6.77	22.10	68.32	11.69	24	54.79	9.13	277.50	272.50	281.05
22	L2	3.260	3.260	0.60	1.96	5.0	5.0	7.95	15.55	15.55	22.73	5.91	24	104.00	1.01	278.75	277.70	282.05
23	GI M2	0.840	0.840	0.60	0.50	5.0	5.0	7.95	4.01	4.01	10.58	2.71	18	49.29	1.01	277.00	276.50	280.73
24	GI M1	0.790	0.790	0.60	0.47	5.0	5.0	7.95	3.77	3.77	17.50	3.23	18	56.89	2.78	276.08	274.50	281.02

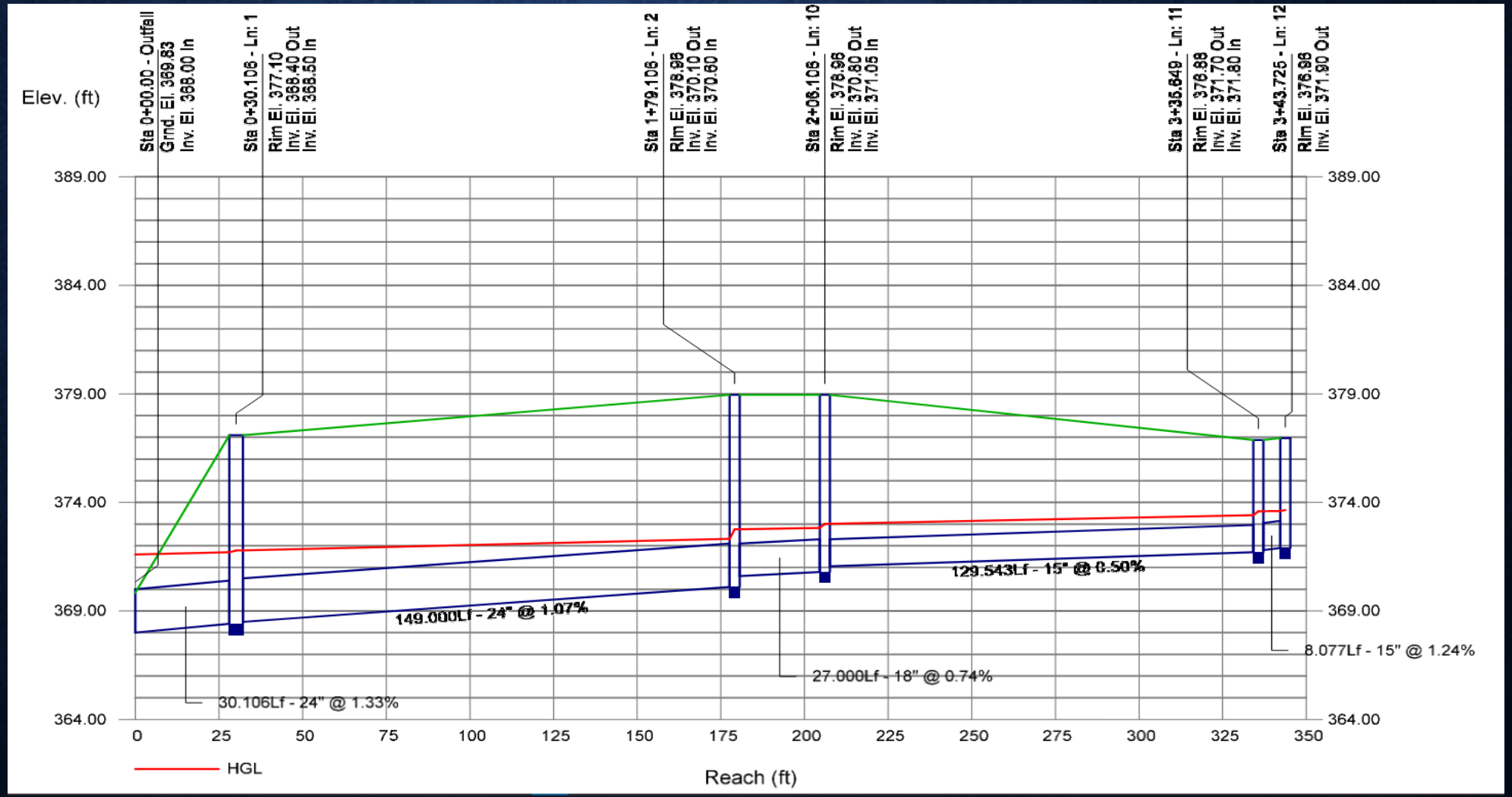
Notes: IDF File = Chatham County.IDF, Return Period = 25-yrs.

Project File: 2024-11-08 Phase 1A SD.sws

DESIGN STANDARDS

STORM DRAINAGE INFRASTRUCTURE – PROFILES

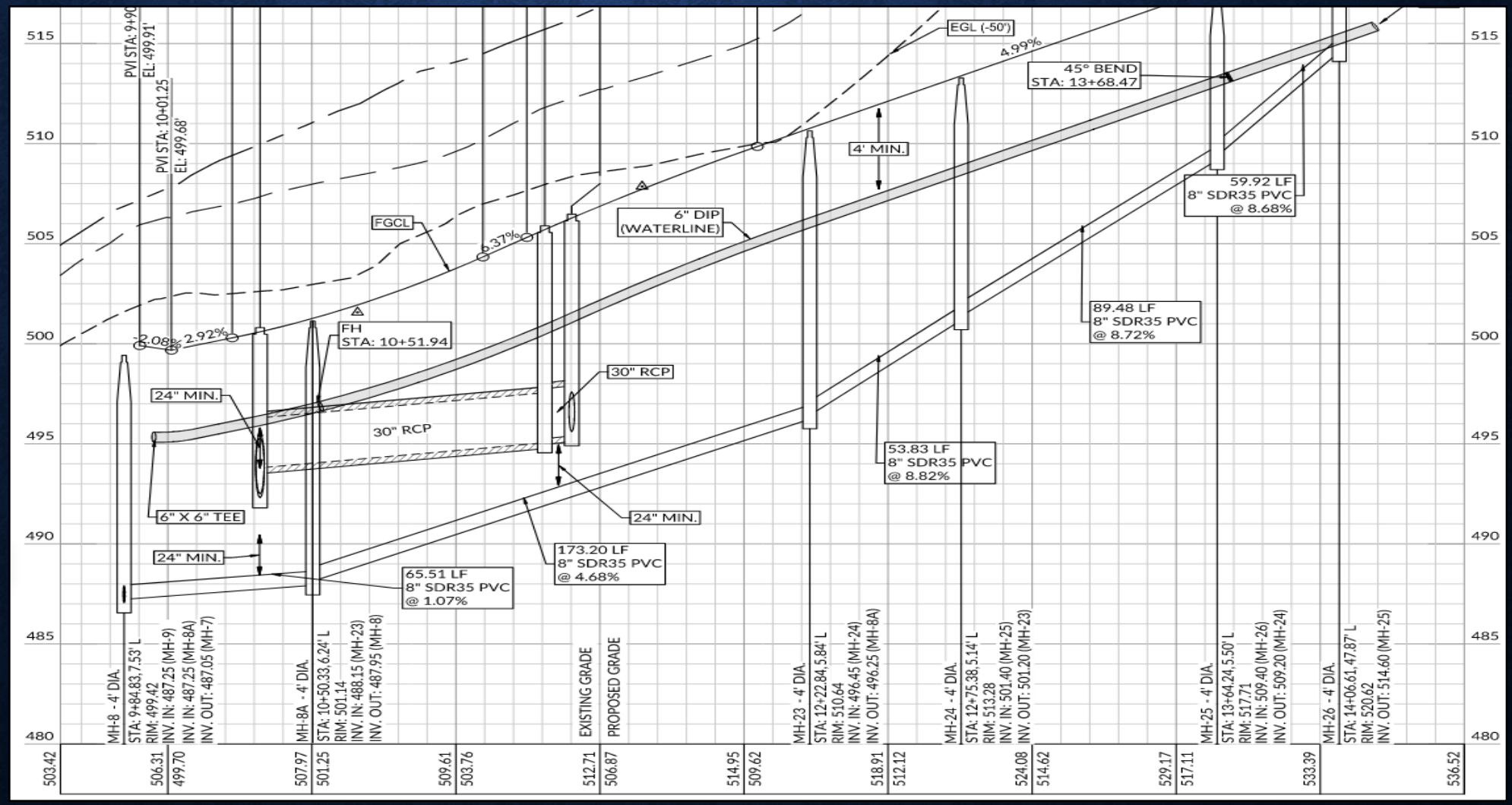
- Included for storm network



DESIGN STANDARDS

ROAD PROFILES

- Included for roads
- Verify minimum cover
- Verify minimum separation



MISCELLANEOUS

NCG01

Soil Stockpile Area

- 50 feet from surface waters, storm inlets, sediment basins, and ditches*
- 50 feet from site perimeter*
- Silt fence low sides offset 5 feet from toe of stockpile

Concrete Washout

- 50 feet from surface waters, storm inlets, sediment basins, and ditches*
- Protect nearby inlets
- Signage

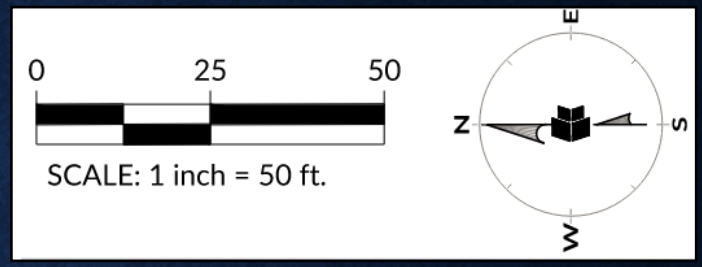
Staging, Parking, Fueling

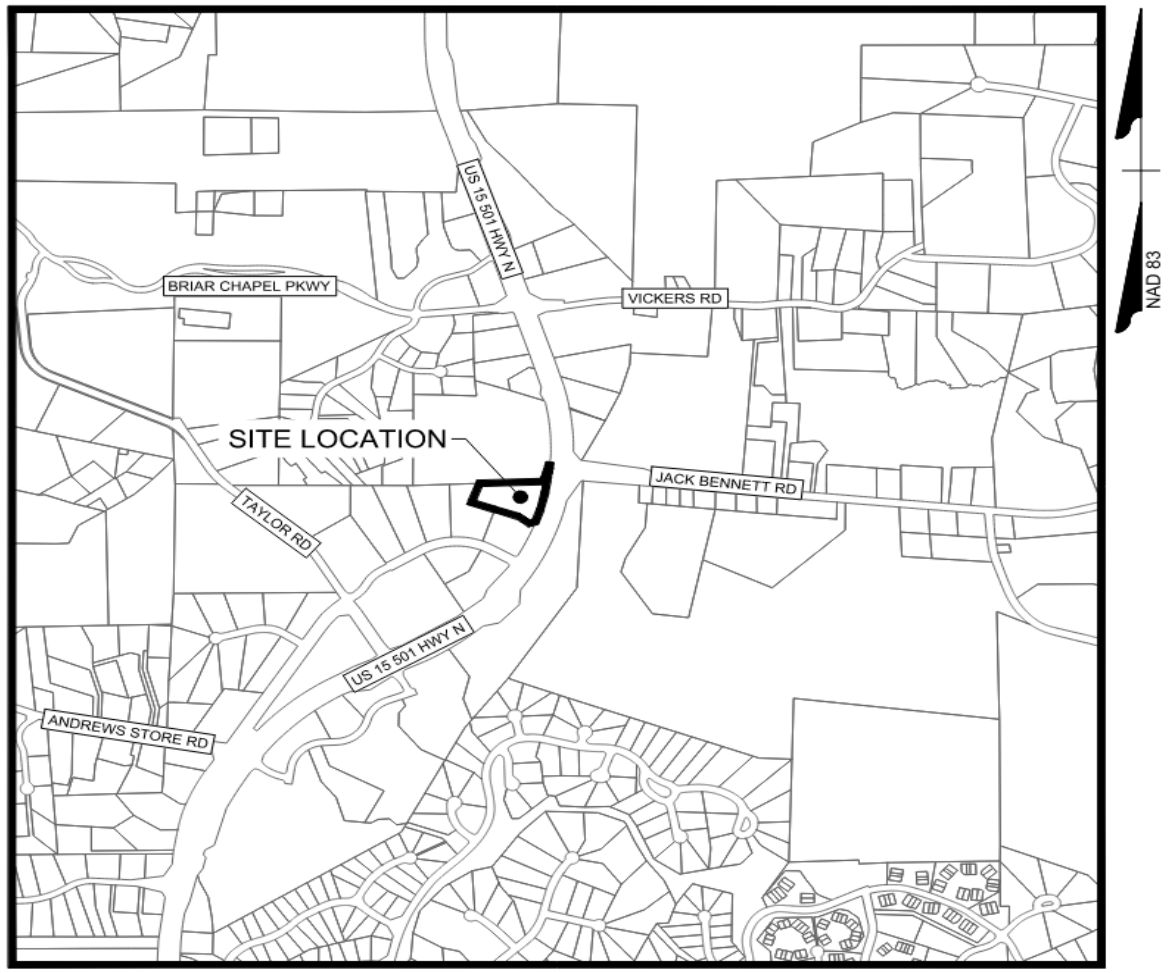
- 50 feet from surface waters, storm inlets, sediment basins, and ditches*
- Locate fueling areas

*Unless no other reasonable alternative exists. Denote on plan.

MISCELLANEOUS

BASIC INFORMATION



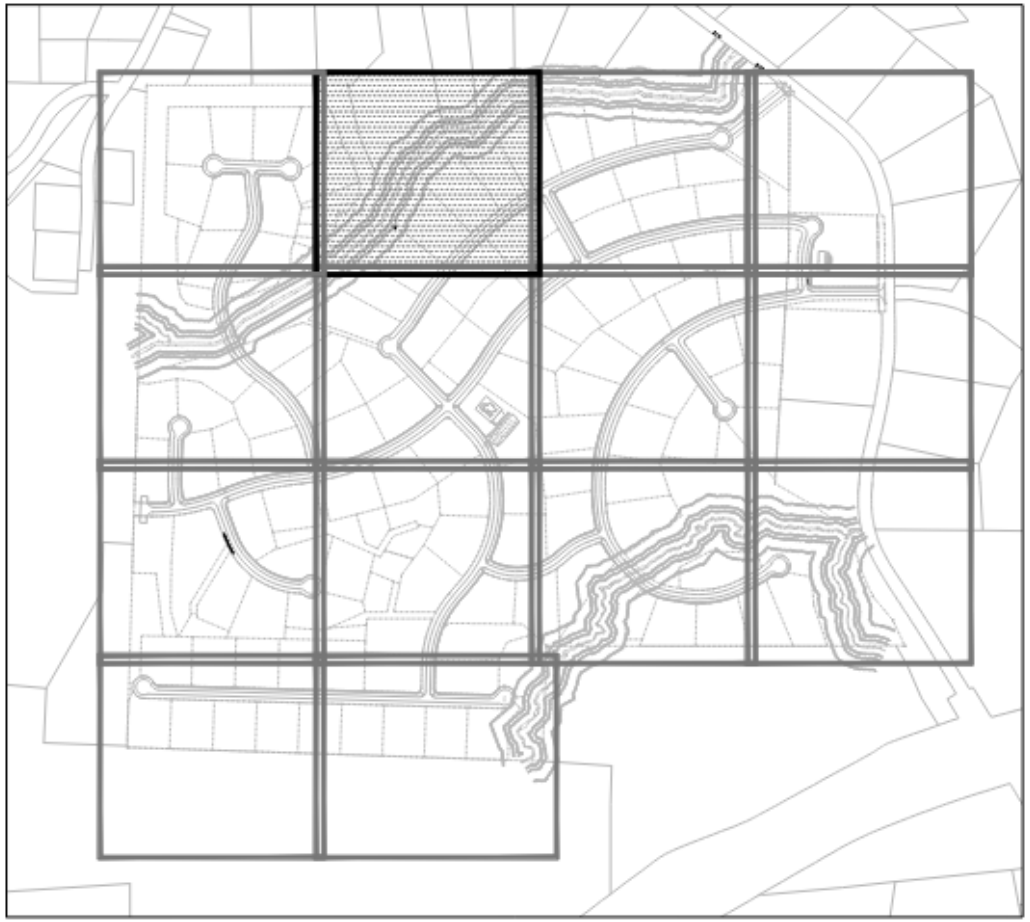


VICINITY MAP
SCALE: 1" = 1000'

SITE DATA TABLE	
PROJECT NAME:	CHATHAM COUNTY EMS
PROJECT ADDRESS:	9251 US 15 501 NORTH FEARRINGTON, NC 27312
TOTAL ACREAGE:	3.03 AC
DEED BOOK / PAGE:	BK: 460, PG: 0669
PIN NUMBER:	977503415782
ZONING:	R-1
USE:	VACANT/WATER TOWER
ONSITE IMPERVIOUS AREA EXISTING:	0.02± ACRES (1,003 SF)
ONSITE IMPERVIOUS AREA PROPOSED:	0.36 ± ACRES (15,568 SF)
TOTAL DISTURBED AREA:	1.56 ± ACRES (61,623 SF)
RIVER BASIN:	CAPE FEAR
STREAM:	HAW RIVER (JORDAN LAKE)
SURFACE WATER CLASSIFICATION:	WS-IV NSW

MISCELLANEOUS

SHEET INDEX



SHEET INDEX

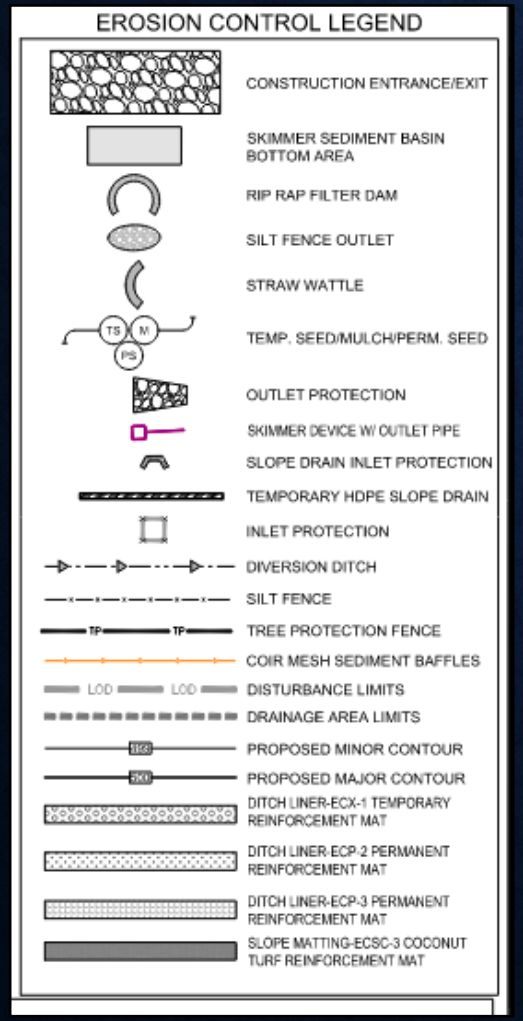
SCALE: 1"=750'

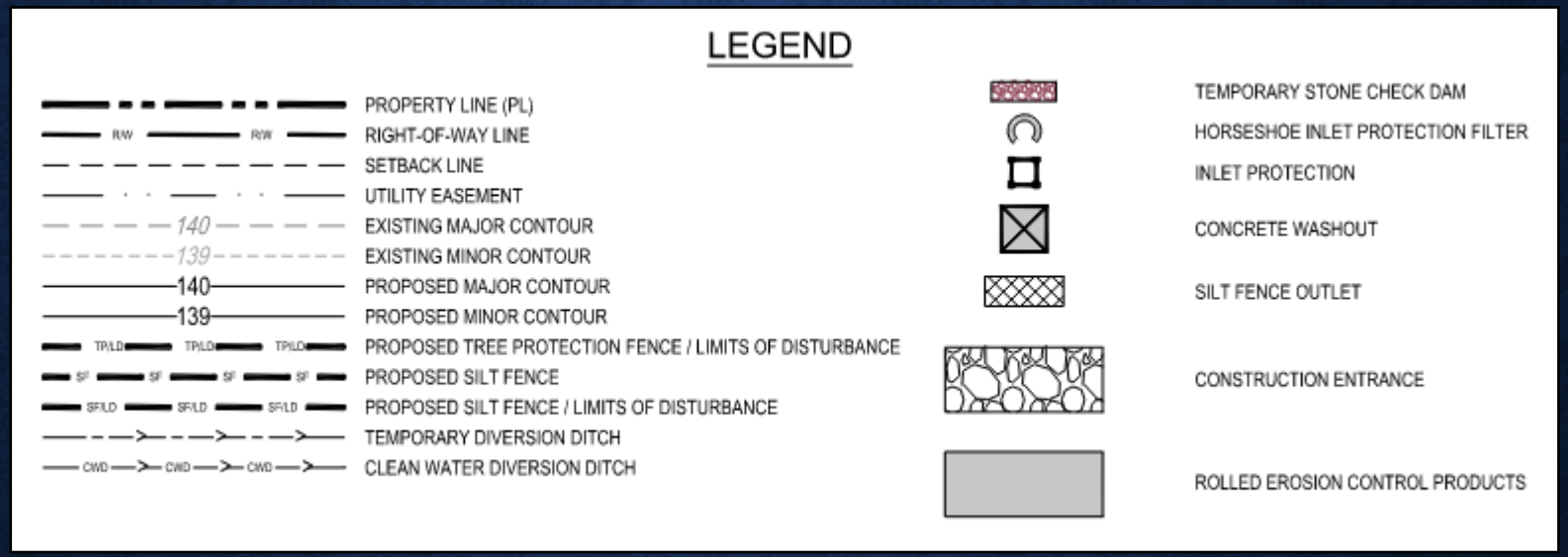
Sheet List Table

Sheet Number	Sheet Title
C0.0	COVER SHEET
C1.0	OVERALL EXISITNG CONDITIONS & DEMOLITION PLAN
C1.1	EXISITNG CONDITIONS & DEMOLITION PLAN
C2.0	EROSION CONTROL PLAN - PHASE 1
C2.1	EROSION CONTROL PLAN - PHASE 2
C2.2	EROSION CONTROL DETAILS
C2.3	EROSION CONTROL DETAILS
C2.4	EROSION CONTROL DETAILS
C2.5	NCG01 GROUND STABILIZATION AND MATERIALS HANDLING
C2.6	NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING
C3.0	SITE PLAN
C3.1	ADJACENT INTERSECTION LOCATIONS
C3.2	OVERALL US15-501 CROSS SECTION MAP
C3.3	US15-501 CROSS SECTIONS
C3.4	US15-501 CROSS SECTIONS
C3.5	US15-501 CROSS SECTIONS
C3.6	INTERSECTION SIGHT DISTANCE PROFILE
C3.7	INTERSECTION SIGHT DISTANCE PROFILE
C4.0	GRADING AND STORM DRAINAGE PLAN
C4.1	BIORETENTION PLAN & PROFILE
C4.3	PRE-DEVELOPMENT DRAINAGE AREA MAP
C4.4	POST-DEVELOPMENT DRAINAGE AREA MAP
C5.0	UTILITY PLAN
C6.0	NOTES AND DETAILS
C6.1	NOTES AND DETAILS
C6.2	NOTES AND DETAILS
C6.3	NOTES & DETAILS
C6.4	NOTES AND DETAILS
C6.5	NOTES AND DETAILS
C6.6	NOTES AND DETAILS
L1.0	OVERALL LANDSCAPE PLAN
L1.1	LANDSCAPE DETAIL PLAN

MISCELLANEOUS

LEGEND





- Contains all erosion control measures
- Between legend and callouts, everything accounted for
- All applicable sheets have own legends (grading, utility, etc.)

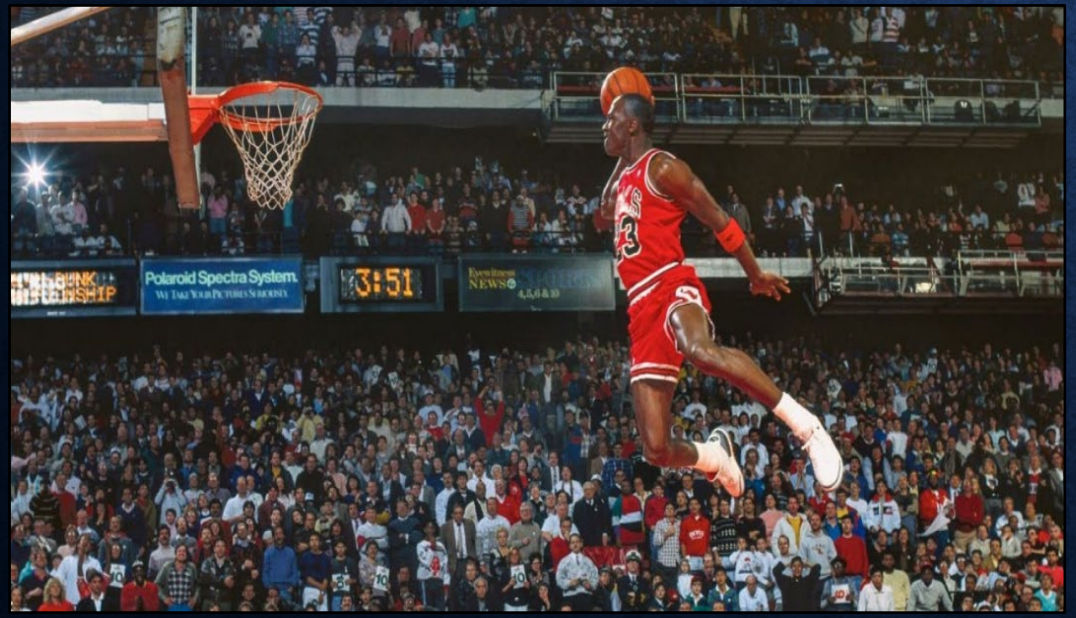
PLAN REVIEW

CONCLUSION

A good plan can be the difference between *environmental compliance* and *environmental damage*.

Make your plan work for you so your planned measures:

Perform like this:



And not like this:

THANK YOU FOR YOUR ATTENTION!

Please remember to complete the end of workshop evaluation:

https://bit.ly/2025EscEval