

Construction Sediment Settling Basin Surface Outlets -or- “Skimmers”

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Stormwater Program**

OHC000006 Part III.G.2.d. Sediment Control Practices

- i. **Timing.** Sediment control structures shall be functional throughout the course of earth disturbing activity. Sediment basins and perimeter sediment barriers shall be implemented prior to grading and within seven days from the start of grubbing. They shall continue to function until the upslope development area is stabilized with permanent cover. As construction progresses and the topography is altered, appropriate controls shall be constructed, or existing controls altered to address the changing drainage patterns.

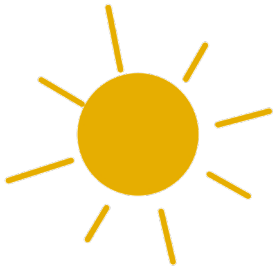
- ii. **Sediment settling ponds.** A sediment settling pond is required for any one of the following conditions:
 - Concentrated or collected stormwater runoff (e.g., storm sewer or ditch);
 - Runoff from drainage areas, which exceed the design capacity of silt fence or other sediment barriers;
 - or
 - Runoff from drainage areas that exceed the design capacity of inlet protection.

*Ohio EPA Permit No. OHC000006, General Permit Authorization for Stormwater Discharges Associated with Construction Activity under the National Pollutant Discharge Elimination System.

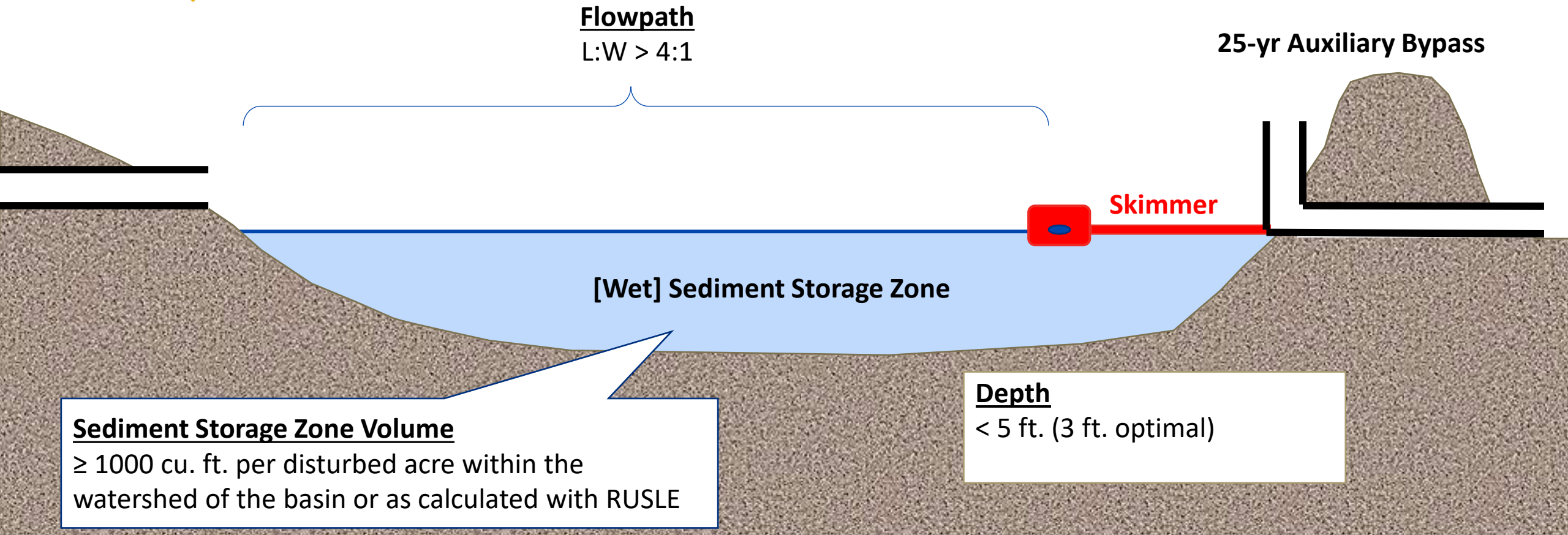
OHC000006 Part II. Non-Numeric Effluent limitations

- F. Surface Outlets.** When discharging from sediment basins utilize outlet structures that withdraw water from the surface, unless infeasible. (Note: Ohio EPA believes that the circumstances in which it is infeasible to design outlet structures in this manner are rare. Exceptions may include time periods with extended cold weather during winter months. If you have determined that it is infeasible to meet this requirement, you shall provide documentation in your SWP3 to support your determination.)

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Sediment Settling Basin Components



Flowpath
L:W > 4:1

25-yr Auxiliary Bypass

Skimmer

[Wet] Sediment Storage Zone

Sediment Storage Zone Volume

≥ 1000 cu. ft. per disturbed acre within the watershed of the basin or as calculated with RUSLE

Depth

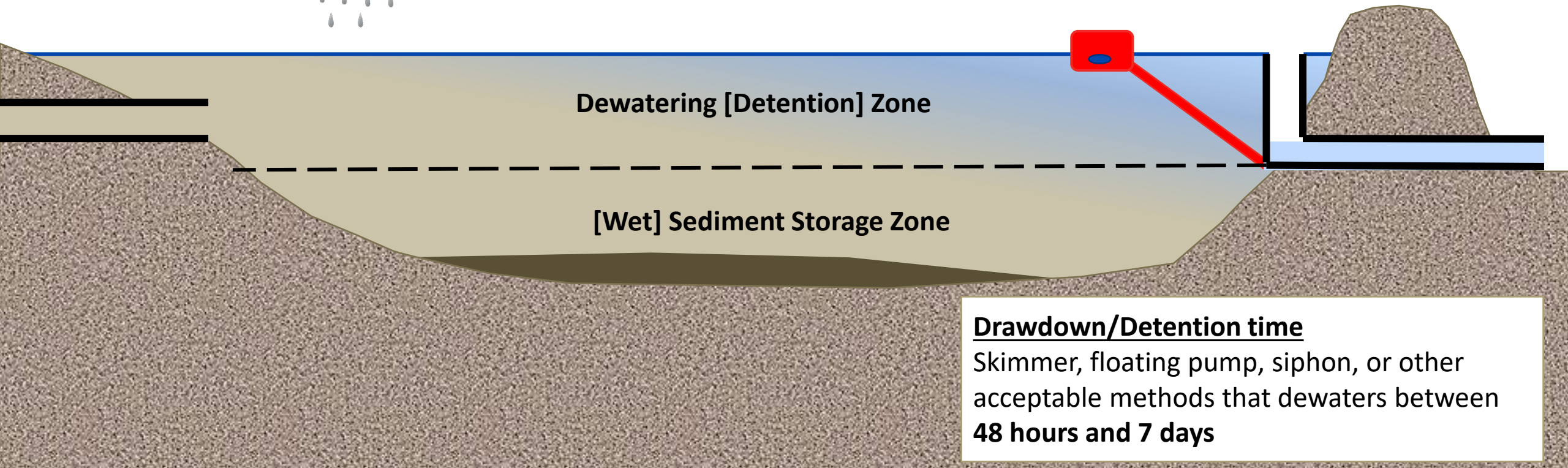
< 5 ft. (3 ft. optimal)

Sediment Settling Basin Components



Dewatering Storage Volume

1800 cu. ft. per acre of drainage area



Drawdown/Detention time

Skimmer, floating pump, siphon, or other acceptable methods that dewater between **48 hours and 7 days**

Skimmer Outlet


Detail the skimmer outlet in the SWP3/construction plans to ensure proper function and discharge criteria are met.

OHC000006 Part III.G.1.n.ix. (SWP3 Requirements) Sediment traps and basins noting their sediment storage and dewatering (detention) volume and contributing drainage area. Ohio EPA recommends the use of data sheets (see Ohio EPA's Rainwater and Land Development manual and website for examples) to provide data for all sediment traps and basins noting important inputs to design and resulting parameters such as their contributing drainage area, disturbed area, detention volume, sediment storage volume, practice surface area, dewatering time, outlet type and dimensions;

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Skimmer Outlet Sizing

Size a skimmer to drain the required dewatering storage volume of 1800 cu. ft. per acre of drainage area between 48 hours and 7 days

 Recommend using Ohio EPA's sediment basin compliance worksheet

Sediment Basin Sizing and Dewatering Compliance Tool version 1.1 2020-06-26

Project Summary

Project Name:	
Project Location:	
Subwatershed ID/Label:	
Project Latitude:	
Project Longitude:	
NPDES Permit Applicant:	
Submitted by:	
Date:	

Watershed:

Subwatershed Total Drainage Area, A_{TDA} = 1.00 acres = 43,560 ft²
Subwatershed Disturbed Drainage Area, A_{DDA} = 1.00 acres = 43,560 ft²

Street address (or street name and nearest intersection), City, state, zip code
Enter latitude at entrance to site in decimal degrees (format: 40.947544)
Enter longitude at entrance to site in decimal degrees (format: -81.465240)
Name of design engineer
mm/dd/yyyy

Select from dropdown which watershed the project is located in, select "Statewide" if not in the Big Darby Creek Watershed

Report to the nearest 0.01 acre; include any drainage from off-site

All Basin dewatering discharge calculations in these worksheets assume free discharge from the outlet (i.e., no tailwater)

Step 1 - Sediment Basin Volume Required

For Statewide Watersheds:

Minimum Sediment Storage Volume, $V_{sediment}$	=	1000	ft ³	=	37	gd ³	=	0.023	acre-ft
Minimum Dewatering Zone Volume, $V_{dewatering}$	=	1800	ft ³	=	67	gd ³	=	0.041	acre-ft

Requirement: Minimum Sediment Volume = 1000 ft³/acre of disturbed drainage area
Requirement: Minimum Dewatering Volume = 1800 ft³/acre of total drainage area

Step 2 - Basin Stage-Storage Relation

Bottom of Sediment Storage (Pond) =	Elevation Area		Incremental Cumulative	
	ft	ft ²	Volume	Volume
<i>IMPORTANT: Must include the exact Skimmer Outlet/Skimmer Stop Elevation and the Secondary Outlet Invert Elevation in the Stage-Storage</i>				

Basin Schematic

Top of Pond Elevation = #NUM! ft
Secondary Outlet Invert Elevation = 0.00 ft
Dewatering Zone
Skimmer Outlet/Stop Elevation = 0.00 ft
Sediment Storage Zone
Bottom of Pond Elevation = 0.00 ft

Note: The basin dewatering discharge calculation in this worksheet assumes a free discharge from the outlet (i.e., no tailwater). The skimmer outlet elevation may need to be adjusted upward to account for tailwater as appropriate. Tailwater is common to low gradient ditches or water

Step 3 - Outlet Elevations and Storage

Skimmer Outlet Invert/Skimmer Stop Elevation =		ft
Secondary Outlet Invert Elevation =		ft

The invert of the Skimmer Outlet/Skimmer Stop (ex. stone pad) corresponds to the top of the sediment storage zone/permanent pool and the bottom of the Dewatering Volume. It The invert elevation for the next (usually peak discharge or flood control) outlet. This elevation must exceed that of the Skimmer Outlet Invert Elevation and be below the top of the pond. Check - The difference between the skimmer outlet invert/skimmer stop

Introduction Basin Sizing & Dewatering Tool Regulatory Guidance

Skimmer Outlet Sizing

Size the skimmer for the **REQUIRED** dewatering volume. In many WQ instances “oversized” is NOT beneficial. It means small, more common storms receive less treatment.

If the dewatering volume **PROVIDED** is larger (perhaps due to the eventual post-construction pond design or need for fill material) than the required 1,800 cu. ft. per acre of drainage area, the skimmer is still sized for 1,800 cu. ft. per acre of drainage area.

Example

10-acre drainage area, 0.5 ac pond

0.5 inches of runoff per acre = 18,000 cu.ft. of runoff

2-day drawdown, $h = 1.4$ ft.

Design A - Minimum Sed Basin requirements

Sediment storage – 10,000 cu. ft.

Dewatering volume – 18,000 cu. ft.

2.9" Diameter skimmer orifice

Design B - Graded for post-const. size

Sediment storage – 30,000 cu. ft.

Dewatering volume – 54,000 cu. ft.

4.6" Diameter skimmer orifice

Basin B is **3x** larger than Basin A
But both have the same drainage area...

Example

- Basin A will fill the dewatering volume completely and drain in 48 hours from the 2.9-inch orifice

FLOW CAPACITIES (IN FT³) FOR THE FAIRCLOTH SKIMMER®

Skimmer size	1.5"	2"	2.5"	3"	4"	5"	6"	8"
24 hours	1,728	3,283	6,234	9,774	20,109	32,832	51,840	97,978
2 day	3,456	6,566	12,468	19,548	40,218	65,664	103,680	195,956
3 day	5,184	9,849	18,702	29,322	60,327	98,496	155,520	293,934
4 day	6,912	13,132	24,936	39,096	80,436	131,328	207,360	391,912
5 day	8,640	16,415	31,170	48,870	100,545	164,160	259,200	489,890
6 day	10,368	19,698	37,404	58,644	120,654	196,992	311,040	587,868
7 day	12,096	22,981	43,638	68,418	140,763	229,824	362,880	685,846

- Basin B will only fill 1/3 of the provided dewatering volume (18,000/54,000 cubic feet) and due to the 4.6-inch orifice, it will dewater in **less** than 24 hours

Skimmer Outlet Sizing

Any type/brand of skimmer may be used but they are not universal!

From the example...

10-acre drainage area, 0.5 ac pond

0.5 inches of runoff per acre = 18,000 cu.ft. of runoff.

2-day drawdown, $h = 1.34$ ft.

Size using manufacturer tools:

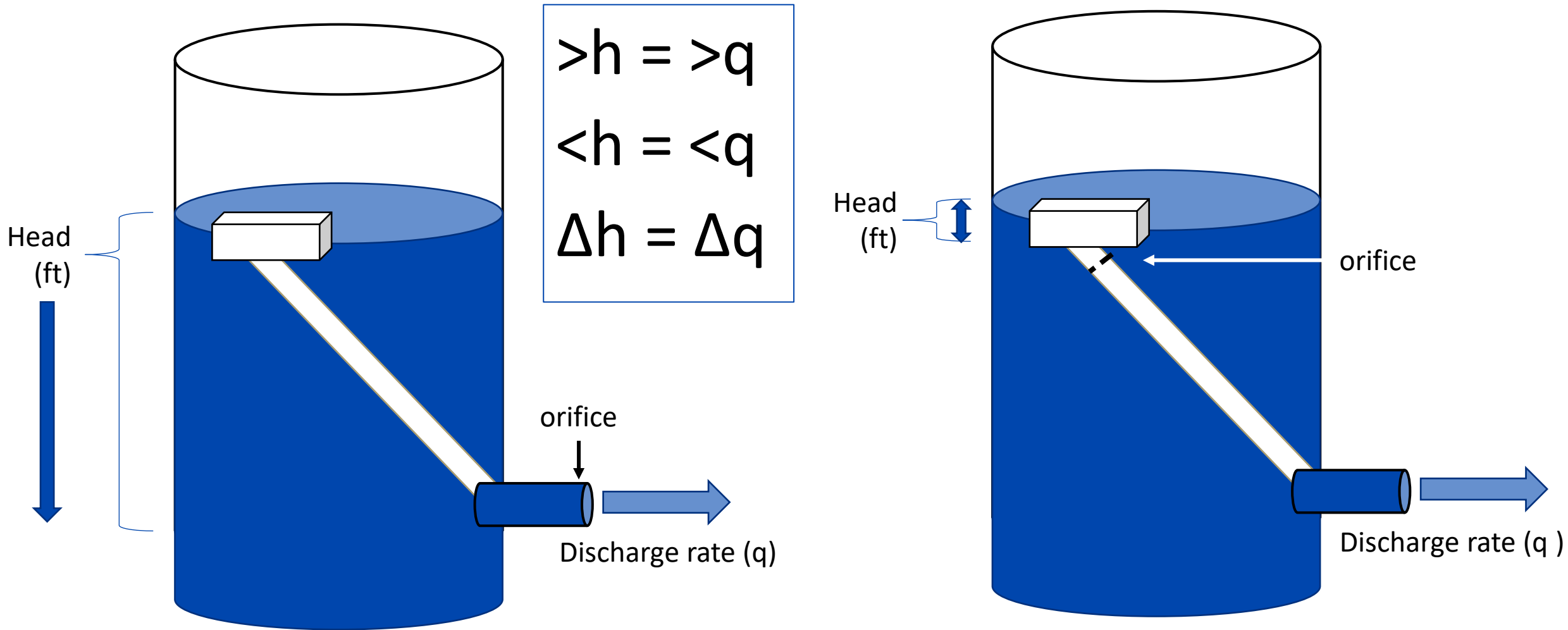
Skimmer A

SKIMMER SIZE 3.0 inches	ORIFICE RADIUS 1.4 inches	ORIFICE DIAMETER 2.9 inches
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Skimmer B

98	41	0.09	66	56
MF 4" - 2.5" Orifice				

Hydraulic Head "h"



Skimmer Outlet Sizing

The SWP3 may include:

- a proprietary specification for a particular brand skimmer with its appropriate size,
- a compliant brand specification for multiple brands and their appropriate sizes, or
- a performance specification with complete data for sourcing.

NOTE: “size” = skimmer and orifice



Either way, recommend including a complete data table in the SWP3/plans to facilitate review.

TEMPORARY SEDIMENT BASIN SCHEDULE

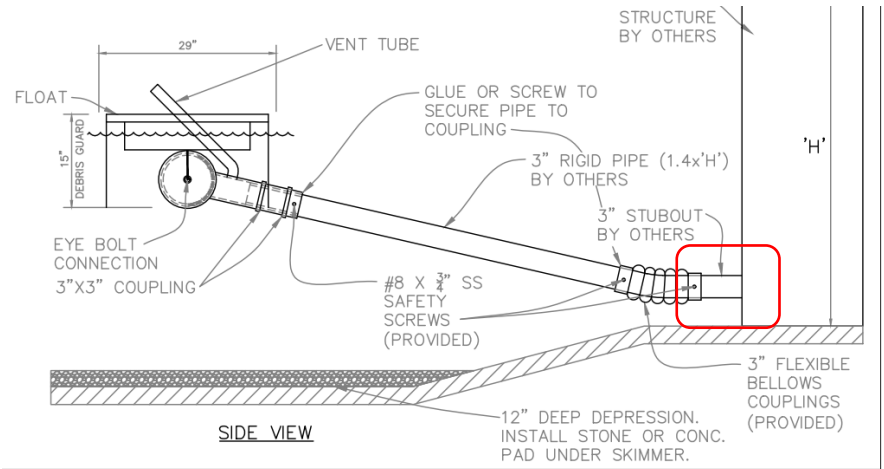
STRUCTURE	TRIBUTARY ACREAGE	DISTURBED ACREAGE	REQUIRED BASIN DEWATER VOLUME (1800 CF/AC)	PROVIDED BASIN DEWATERING VOLUME	REQUIRED SEDIMENT STORAGE VOLUME (1,000 CF/DISTURBED AC)	PROVIDED SEDIMENT STORAGE VOLUME	DEWATERING VOLUME DRAWDOWN (HR)	REQUIRED DEWATERING VOLUME DEPTH (FT)
A	29.62	26.58	53,316	53,316	29,620	142,487	72	0.85

Skimmer "Design"

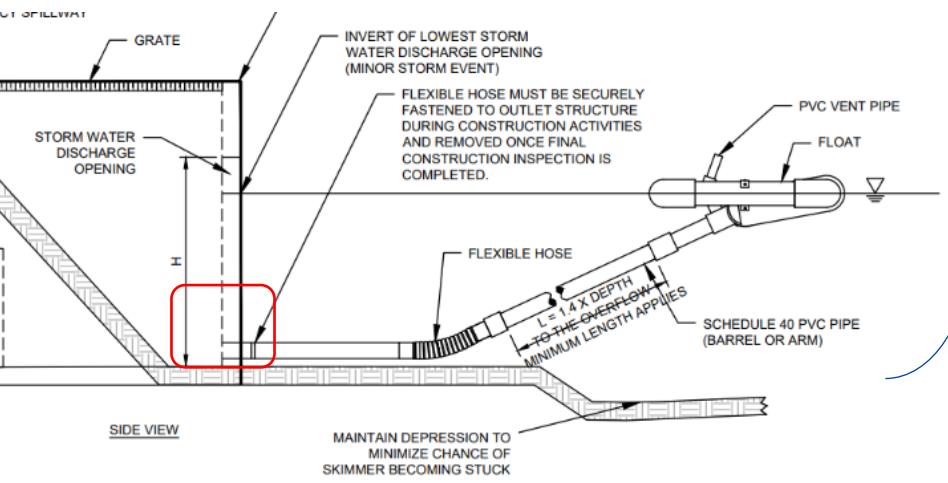
With the hydraulic design complete, there is more design work to do!!

Do NOT rely solely on manufacturer cut sheets and drawings to indicate proper on-site construction/installation.

- Installed as shown in drawing may not comply with the Ohio EPA's CGP (Sediment storage zone?)
- Outlet structure configuration, connection?



	WEB PAGE	SCALE	PROPERTY LOCATION
	WWW.RymarWaterWorks.COM	N.T.S.	----
PHONE #	DATE		
1-855-697-9333	12/04/2022	County, State	



Skimmer “Design”

1. Design any necessary temporary outlet modifications. It will be necessary to:

- A. Temporarily connect the skimmer to the permanent outlet structure with a secure, watertight connection.





 Recommend Kor-N-Seal or equivalent

Skimmer "Design"

1. Design any necessary temporary outlet modifications. It will be necessary to:

- A. Temporarily connect the skimmer to the permanent outlet structure with a secure, watertight connection.
- B. Temporarily block permanent outlets as necessary to develop dewatering storage volume.
- C. Delay installing post-construction orifice?



Blocked?

Skimmer "Design"

2. Specify all other skimmer connections.

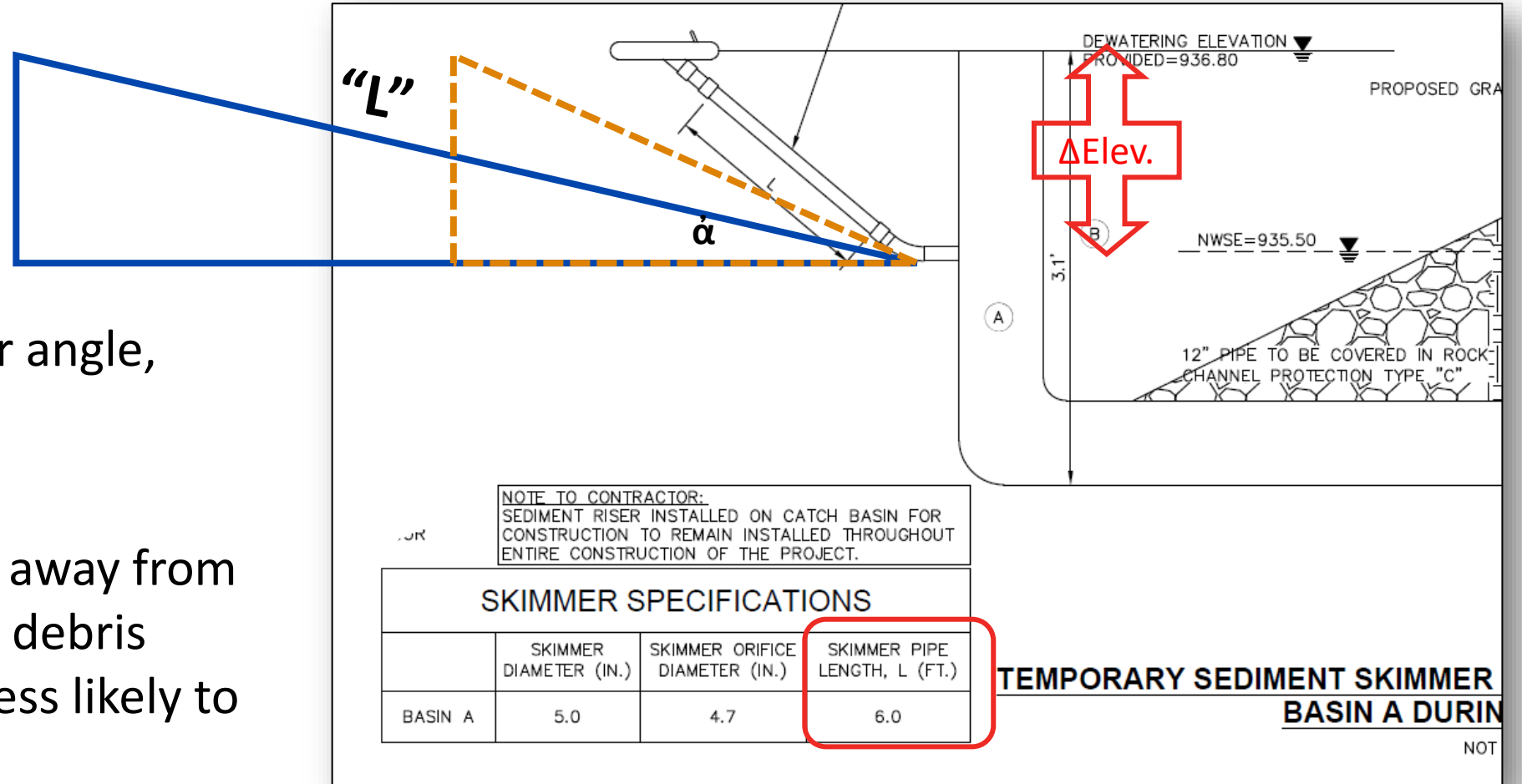
- A. Be more specific than "flexible connection".
- B. Specify the arm length.



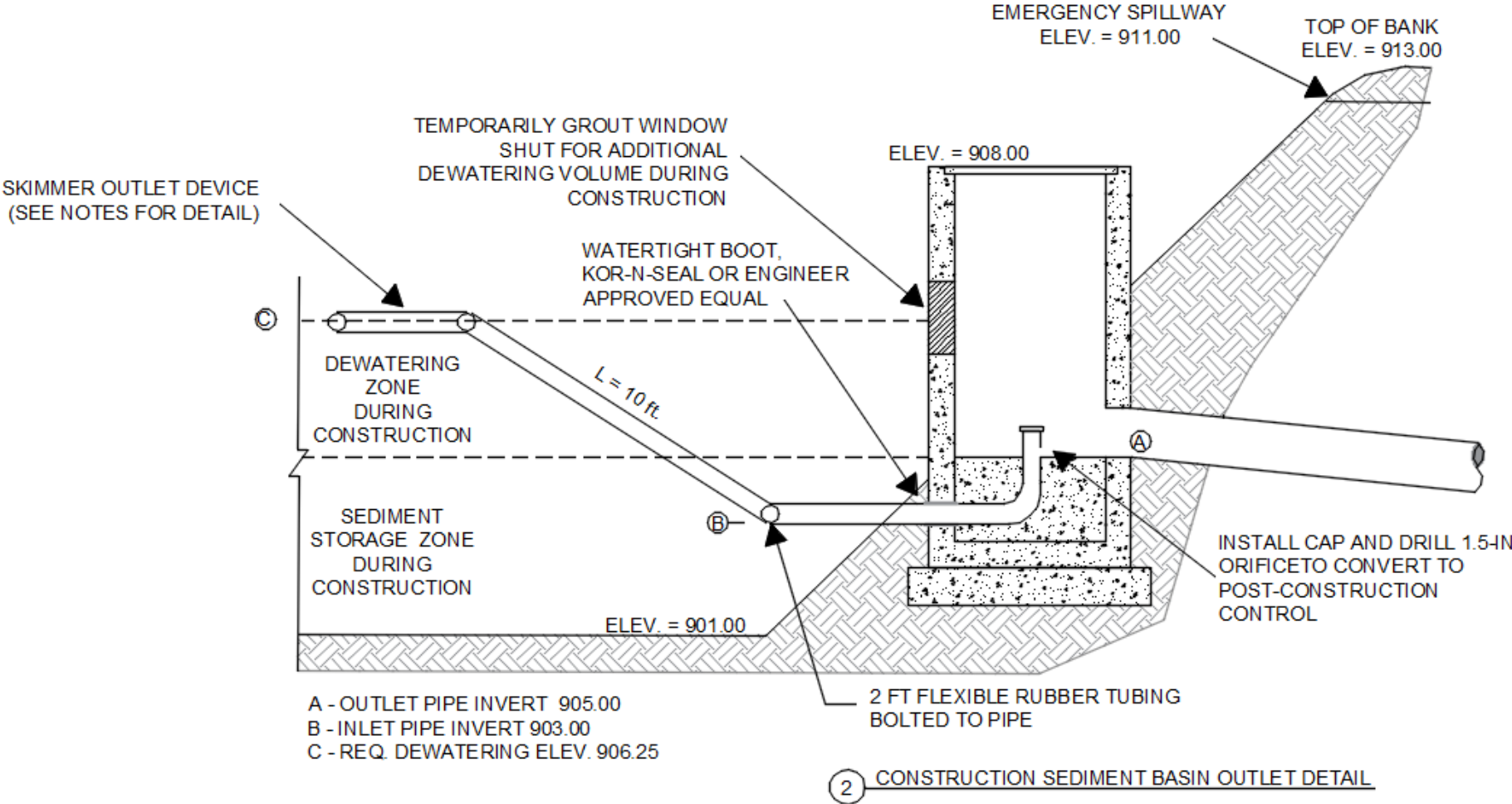
Skimmer "Design"

Longer arm = smaller angle, less flex, less stress.

Also places skimmer away from shoreline where less debris accumulates and is less likely to get stuck in muck.



What should the SWP3 look like ?



Sediment Basin Data	
Tributary Acreage	24.45 ac
Disturbed Tributary Acreage	22.57 ac
Req'd Sediment Storage Zone Vol.	ac
Provided Sediment Storage Zone Vol.	ac
Req'd Dewatering Zone Vol.	ac
Provided Dewatering Zone Vol.	ac
Req'd Dewatering Zone Depth (h)	1.25 ft.
Design Dewatering Time	72 hours

- Notes:
1. Skimmer shall be 4"-inch XXXXX with a 3.2-inch orifice or engineer approved equal.
 2. Skimmer to remain in place until the drainage area reaches final stabilization.
 3. Install according to manufacturer's recommendations.
 - 4.

If the planned post-construction control is not a wet basin, the temporary sediment basin may require careful planning and additional modifications.

Bioretention & Infiltration Practices



- Under excavate to protect infiltration rate
- Final excavation and media placement after stabilization of drainage area.

If the planned post-construction control is not a wet basin, the temporary sediment basin may require careful planning and additional modifications.



- Modify outlet for permanent pool
- Seed after completion
- Protect underdrains, etc.

If the planned post-construction control is not a wet basin, the temporary sediment basin may require careful planning and additional modifications.



- Sediment Traps at inlets.

Questions and Thank You!

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