CHRISTOPHER B. BURKE ENGINEERING, LLC

2023 Northwest Indiana Annual MS4 Required Training:

Common Construction Challenges and Solutions

Drew Gamble, Resource Planner

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Presentation Overview

- Effective and efficient sequencing
- Temporary stabilization
- Dewatering
- Concrete Washout
- Good housekeeping

Let's not forget our mission: Reducing Pollution in Stormwater Runoff

Sediment runoff rates from construction sites are typically 10 to 20 times greater than those from agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction activity can contribute more sediment to streams than can be deposited over several decades, causing physical and biological harm to our Nation's waters.

United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-013 January 2000 (revised December 2005) Fact Sheet 3.0

EPA

Stormwater Phase II Final Rule

Small Construction Program Overview

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Proposed Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who's Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/ Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

2.7 – Post-Construction Runoff Control

2.8 – Pollution Prevention/Good Housekeeping

2.9 – Permitting and Reporting: The Process and Requirements

2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial "No Exposure"

4.0 – Conditional No Exposure Exclusion for Industrial Activity

The 1972 amendments to the Federal Water Pollution Control Act, later referred to as the Clean Water Act (CWA), prohibit the discharge of any pollutant to navigable waters of the United States from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Efforts to improve water quality under the NPDES program traditionally have focused on reducing pollutants in industrial process wastewater and municipal sewage treatment plant discharges. Over time, it has become evident that more diffuse sources of water pollution, such as stormwater runoff from construction sites, are also significant contributors to water quality problems.

Sediment runoff rates from construction sites are typically 10 to 20 times greater than those from agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction activity can contribute more sediment to streams than can be deposited over several decades, causing physical and biological harm to our Nation's waters.

In 1990, EPA promulgated rules establishing Phase I of the NPDES stormwater program. Phase I addresses, among other discharges, discharges from large construction activities disturbing 5 acres or more of land. Phase II of the NPDES stormwater program covers small construction activities disturbing between 1 and 5 acres. Phase II became final on December 8, 1999 and small construction permit applications were due by March 10, 2003 (specific compliance dates will be set by the NPDES permitting authority in each State). This fact sheet outlines the construction activities covered by Phase I and Phase II, including possible waiver options from Phase II coverage, and the Phase II construction program requirements.

Who Is Covered Under the Phase I Rule?

Sites Five Acres and Greater

The Phase I NPDES stormwater rule identifies eleven categories of industrial activity in the definition of "stormwater discharges associated with industrial activity" that must obtain an NPDES permit. Category (x) of this definition is construction activity, commonly referred to as "large" construction activity. Under category (x), the Phase I rule requires all ***operators*** of construction activity ***disturbing 5 acres or greater of land*** to apply for an NPDES stormwater permit. Operators of sites disturbing less than 5 acres are also required to obtain a permit if their activity is part of a "larger common plan of development or sale" with a planned disturbance of 5 acres or greater. "Disturbance" refers to exposed soil resulting from activities such as clearing, grading, and excavating. Construction activities can include road building, construction of residential houses, office buildings, industrial sites, or demolition.

What Is Meant by a "Larger Common Plan of Development or Sale"?

As defined in EPA's NPDES stormwater general permit for construction activity, a "larger common plan of development or sale" means a contiguous area where multiple separate and distinct construction activities are occurring under one plan (e.g., the operator is building on three half-acre lots in a 6-acre development). The "plan" in a common plan of development or sale is broadly defined as any announcement or piece of documentation

Challenges for Effective Sequencing

Challenge

- "means and methods"
- Sequencing can be disrupted by disruptions in availability of materials and labor
- Inflexible scheduling
- Cookie cutter sequences

STORMWATER QUALITY CONSTRUCTION SEQUENCE

The sequence of when each measure will be implemented is summarized below.

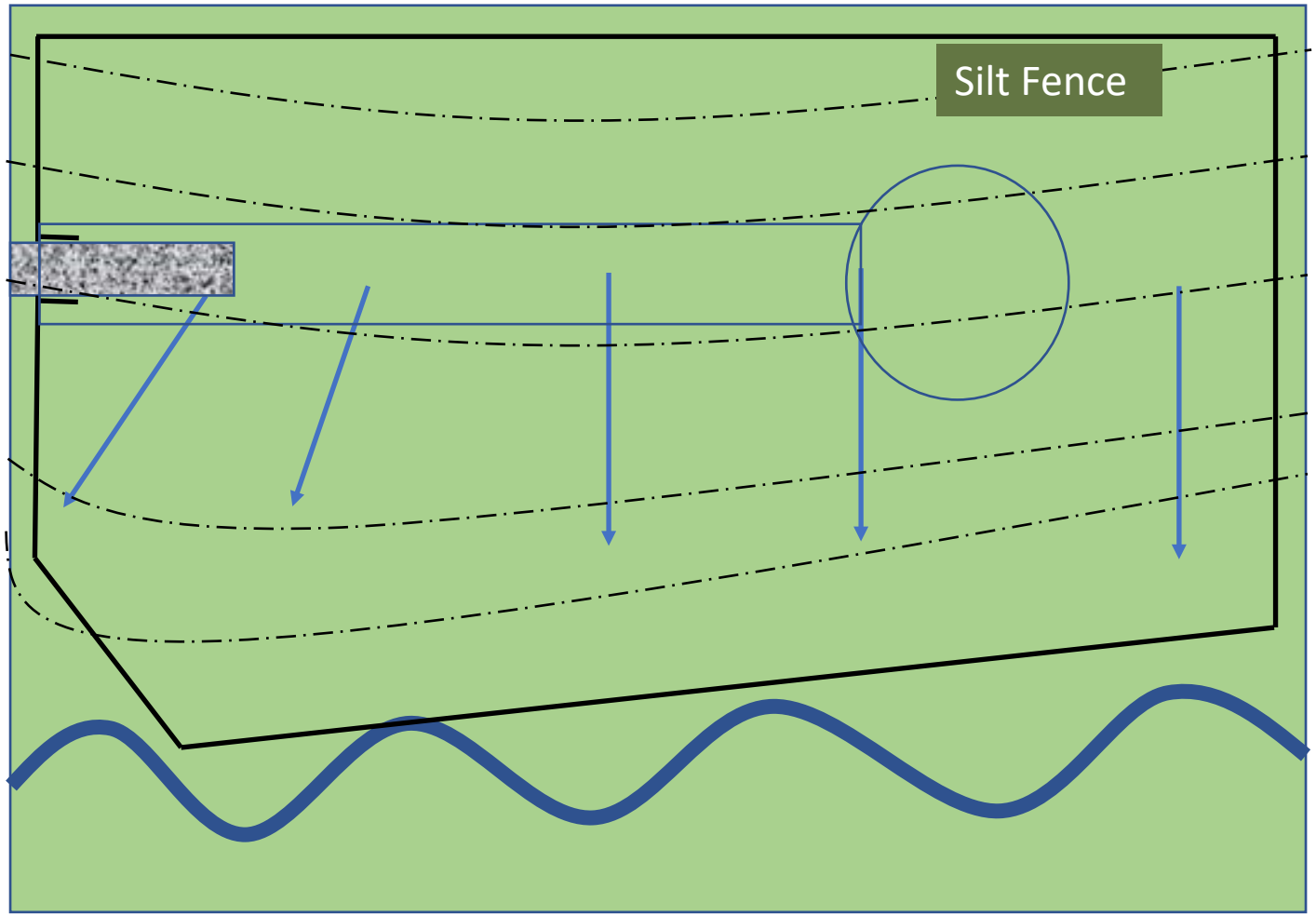
- Post signed NOI, NPDES Permit Number, the City Storm Water Permit, contact information for the site and the location where construction plans may be obtained in a visible location at the entrance to the site.
- Construct gravel construction entrance.
- Install silt fence/fiber rolls at the construction limits of the site prior to construction.
- Initiate weekly Self-montoring program.
- Mass grade the site, with the detention pond being the initial area of work.
- Install pond outlet protection.
- Construct temporary diversion swales where required during construction activity to diver large amounts of runoff are to the storm water pond until the storm water system is installed.
- Install underground utilities.
- Inlet protection as detailed on these plans is to be installed surrounding each inlet/drywell/catch basin until work is completed and protection has been approved for removal.
- All areas are to be permanently seeded and blanketed as soon as possible.
- Temporary seeding shall be placed 14 days after grading is complete or if disturbed ground is intended to be left for a period of more than 14 days.
- Install curb and construct roadway.
- Sediment shall be removed from the detention pond and permanent seeding placed.
- Erosion control features shall be maintained until construction is complete.
- Any temporary erosion control measures are to be removed once permanent vegetative cover has been established.
- Rule 5 Notice of Termination shall be submitted.

See attached details for acceptable erosion and sedimentation control installation methods.

Sequencing Solution: Cookie Cutter Sequences

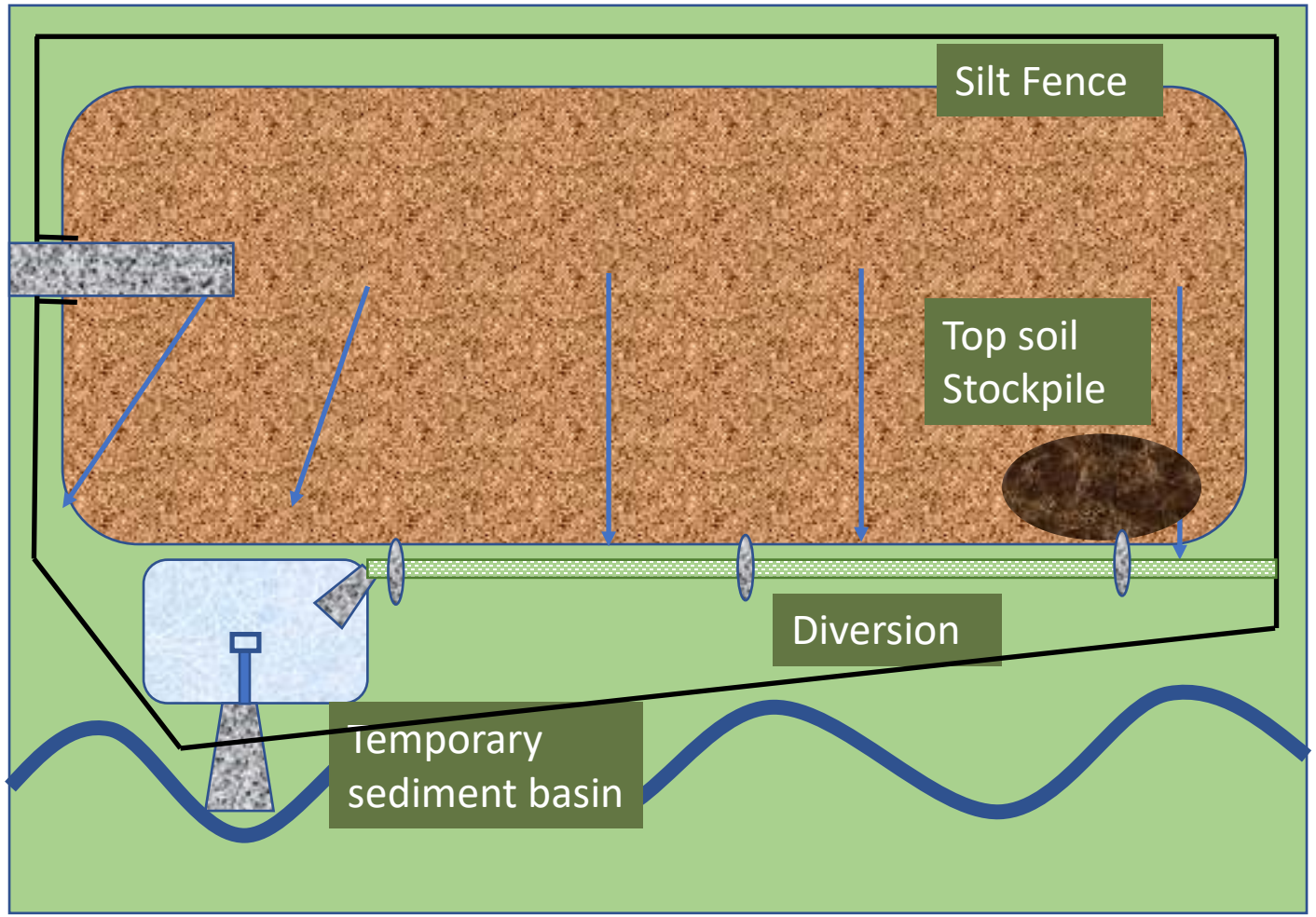
- Discuss in detail during pre-construction meeting
- Make sequence project specific – the contractor can make modifications to the approved SWPPP
- Identify when and how stormwater quality measures will be implemented relative to land-disturbing activities
- Calendar of activities, including phases of project and when stormwater quality measures will be installed

Sequencing Solution: Phase 1A



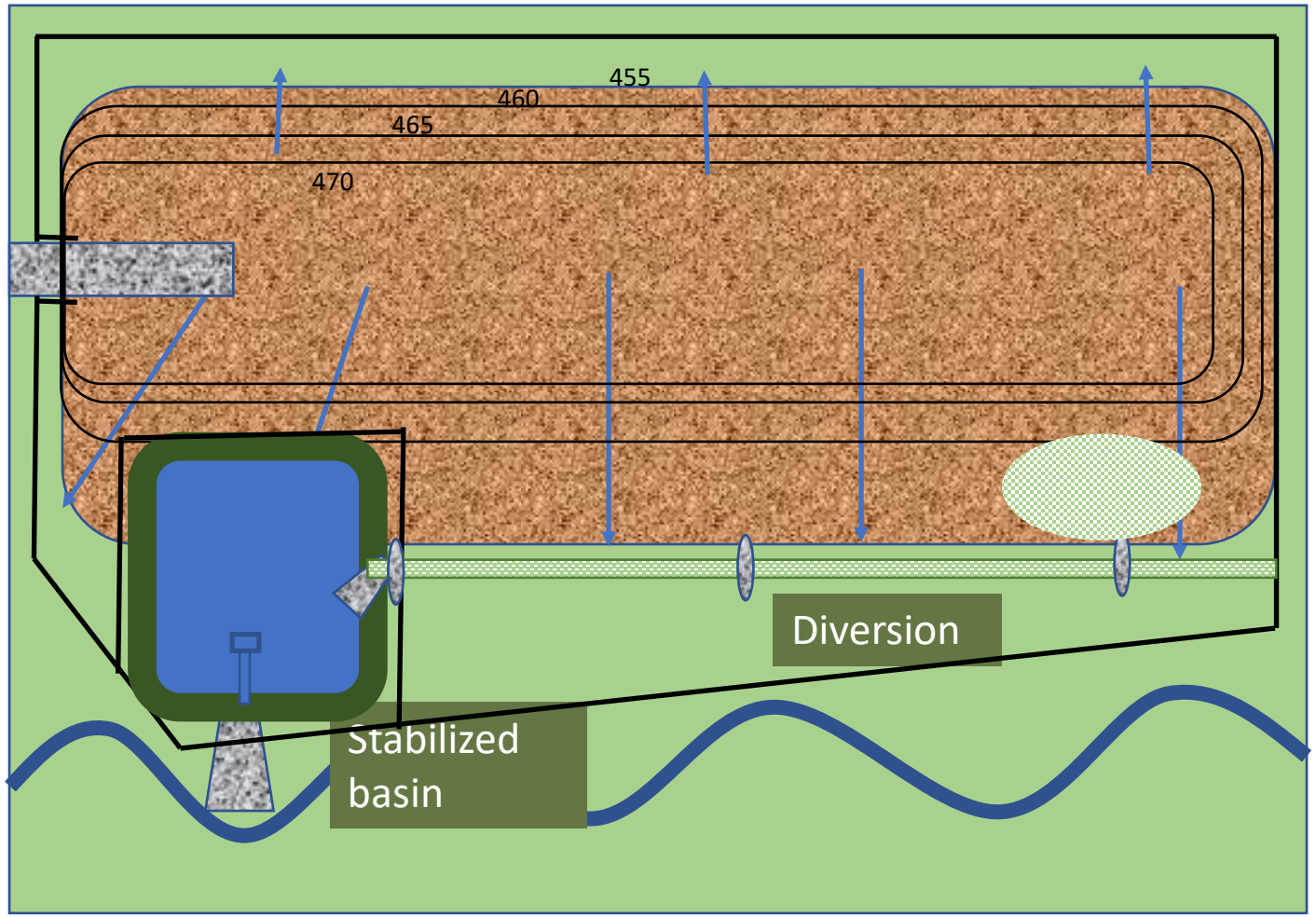
Phase 1A
Prior to mass grading, install construction entrance and perimeter control measures

Sequencing Solution: Phase 1B



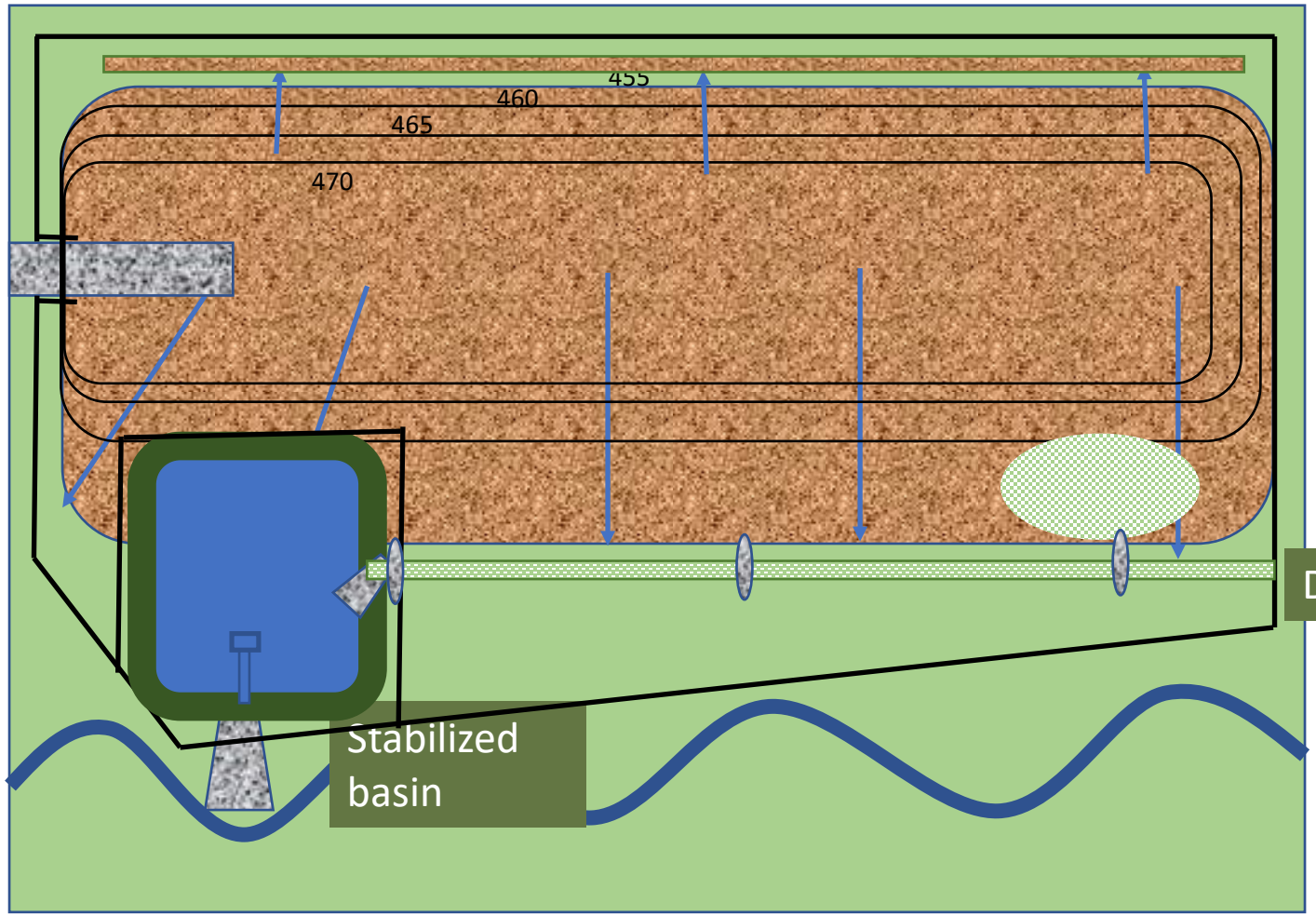
Phase 1B
At the start mass grading install temporary diversions to direct water to basin/sediment control measure for concentrated flow

Sequencing Solution: Phase 2A



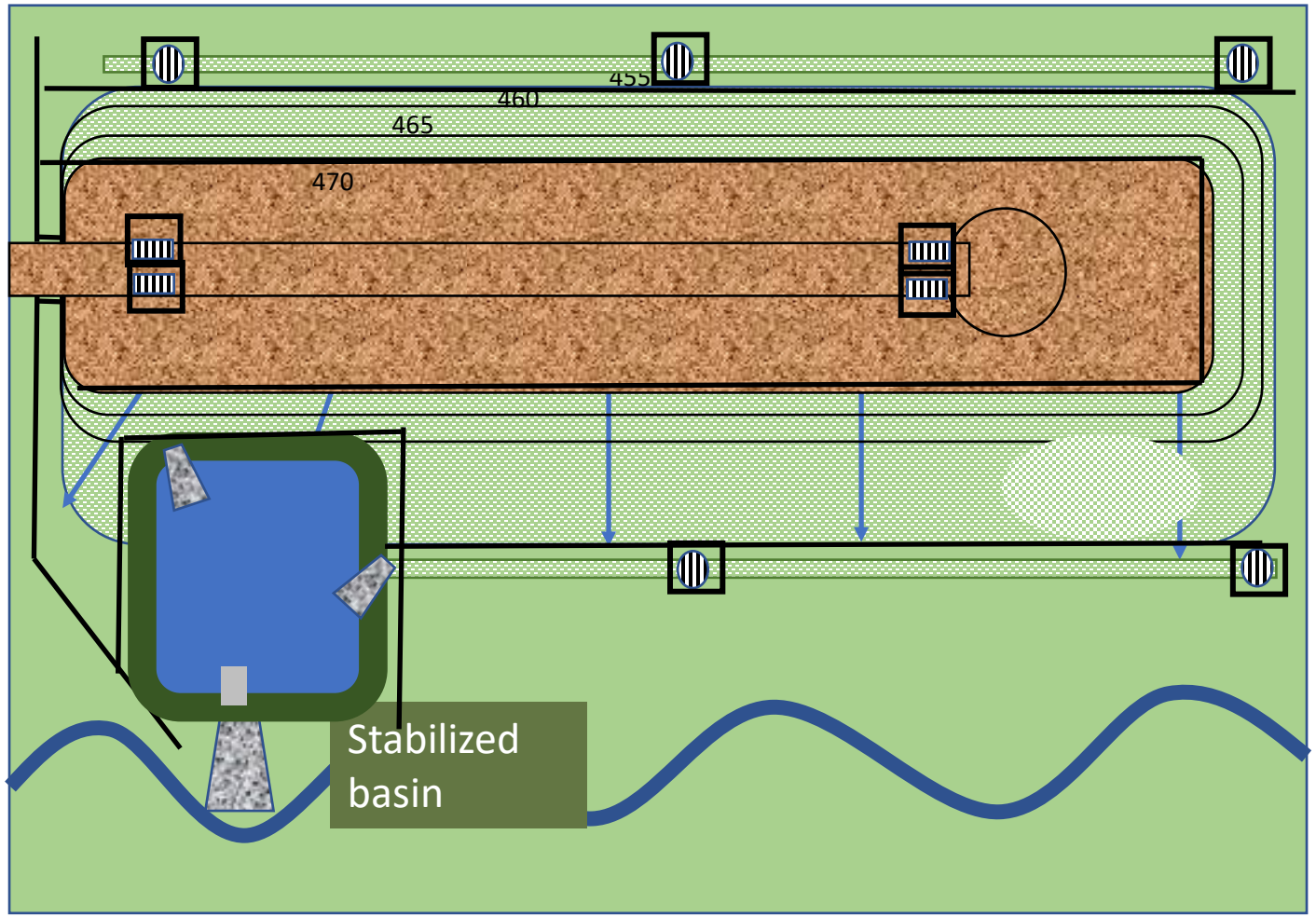
Phase 2A
Complete basin and stabilize, fill lots to achieve elevations

Sequencing Solution: Phase 2B



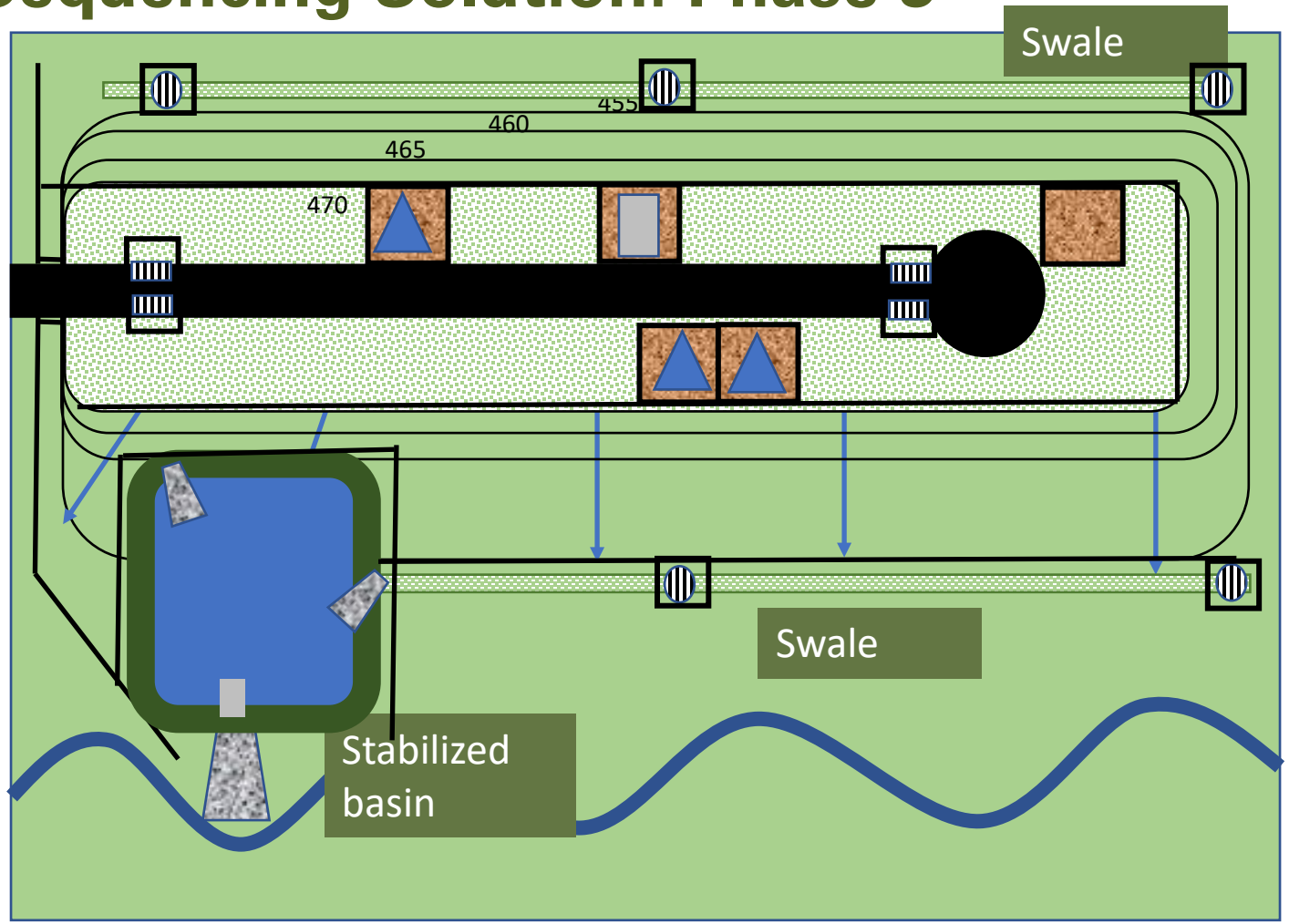
Phase 2B
Achieve lot elevations and areas of the site that will not be worked for 7+ days (lots, common areas)

Sequencing Solution: Phase 2C



Phase 2C
Underground utilities are installed, including storm sewers and outlet protection

Sequencing Solution: Phase 3



Phase 3
Roads are paved, final grading of common areas, building construction ongoing

Sequencing Solution: Tips

- Have a plan but be flexible
- Budget for maintenance, contingency
- Have alternative options when BMP is delayed (include alternative in the plan)
- Understand stabilization requirements (7 days) and needs for season and time of the project
- Beware of cookie cutter sequences
  - SWPPP sequencing should be seamless with construction plan
  - If you receive a plan with a cookie cutter sequence, make amendments where appropriate and document changes in the project management log

Sequencing Solution: Cookie Cutter Sequences

- Beware of cookie cutter sequences
  - SWPPP sequencing should be seamless with construction plan
  - If you receive a plan with a cookie cutter sequence, make amendments where appropriate
  - Document changes in the project management log

Challenges and Solutions: Understanding Temporary Stabilization

CSGP 3.4 Stabilization Requirements

(a) Un-vegetated areas that are left idle or scheduled to be left inactive must be temporarily or permanently stabilized with measures appropriate for the season to minimize erosion potential. To meet this requirement the following apply:

(1) Stabilization must be initiated by the end of the seventh day the area is left idle. The stabilization activity must be completed within fourteen (14) days after initiation. Initiation of stabilization includes, but is not limited to, the seeding and/or planting of the exposed area and applying mulch or other temporary surface stabilization methods where appropriate. Areas that are not accessible due to an unexpected and disruptive event that prevents construction activities are not considered idle.

(2) Areas that have been compacted may be excluded from the stabilization requirement when the areas are intended to be impervious surfaces associated with the final land use, provided run-off from the area is directed to appropriate sediment control measures.

Challenges and Solutions: Understanding Temporary Stabilization

CSGP 3.4 Stabilization Requirements

(a) Un-vegetated areas that are left idle or scheduled to be left inactive must be temporarily or permanently stabilized with measures appropriate for the season to minimize erosion potential. To meet

Schedule when areas will be left idle, and include in sequencing, calendar, and budget

Budget for incidental temporary stabilization

- Stockpiles that weren't expected
- Minor repairs to swales or lots

Challenges and Solutions: Understanding Temporary Stabilization

CSGP 3.4 Stabilization Requirements

(a) Un-vegetated areas that are left idle or scheduled to be left inactive m
stabilized with **measures appropriate for the season** to minimize er
requirement the following apply:

Dormant seeding – increase seed application rate by 1.5x

Straw mulch can serve as temporary stabilization, but it needs to be anchored to the soil (e.g. crimping or tackifier)

Photo source: Indiana Storm Water Quality Manual

Challenges and Solutions: Understanding Temporary Stabilization

Surface stabilization always more effective than sediment control

Photo source: IDEM

nts

scheduled to be left inactive must be temporarily or permanently

or the season **to minimize erosion potential**. To meet this

the end of the seventh day the area is left idle. The stabilization

fourteen (14) days after initiation. Initiation of stabilization

seeding and/or planting of the exposed area and applying mulch

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Challenges and Solutions: Understanding Temporary Stabilization

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construction activities are not considered idle.

This does not mean that the site needs to be stable by day 7, but the process of stabilization must be started by day seven. The entire idle area must be seeded, mulched, etc. 14 days after that process begins

Challenges and Solutions: Understanding Temporary Stabilization

CSGP

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(1 d by the end of the . The stabilization within fourteen (14) of stabilization o, the seeding and/or planting of the exposed area and applying mulch or other temporary surface stabilization methods where appropriate. **Areas that are not accessible due to an unexpected and disruptive event that prevents construction activities are not considered idle.**

This provision is to account for natural disasters or events that would prevent construction activities.

(2) Areas that have been compacted may be excluded from the stabilization requirement when the areas are intended to be impervious surfaces associated with the final land use, provided run-off from the area is directed to appropriate sediment control measures.

Challenges and Solutions: Understanding Temporary Stabilization

CSGP 3.4 Stabilization Requirem

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(1) Stabilization must be in on activity must be comple includes, but is not limi ulch or other temporary sur ble due to an unexpected a red idle.

Generally, this can include roadways, building pads, and other impervious surfaces that require compaction

(2) Areas that have been compacted may be excluded from the stabilization requirement when the areas are intended to be impervious surfaces associated with the final land use, provided run-off from the area is directed to appropriate sediment control measures.

Challenges and Solutions: Temporary Stabilization Tips

- **Sequencing:** Temporary and permanent stabilization should be included in the sequence,
- **Seed Specifications:** Selection, application methods, mulch protection, locations (e.g. slopes, detention ponds, out lots)
- **Budgeting:** Don't just budget for final stabilization. Consider things like stockpiles, out lots, minor repairs. Be prepared to apply seed/mulch throughout the project
- **Seasonality:** Choose seeds appropriate for the time you are seeding. Prepare for winter, and if you don't get things buttoned up before the seeding window, have a back up plan.
- **Alternatives:** Riprap, proprietary erosion control products can be used as permanent stabilization. Tarping stockpiles or disturbed areas can serve as a quick fix for temporary stabilization.

Challenges and Solutions for Dewatering

CSGP 3.3(a)(6) Discharge from dewatering of ground water from excavations, trenches, foundations, etc must not be discharged when:

(A) Sediment-laden water is not first directed to an appropriate sediment control measure or a series of control measures that minimizes the discharge of the sediment.

(B) A visible sheen and/or pollutants are present at a level that requires additional treatment and/or an alternate permit.

Solutions for Dewatering: Required to be Included in SWPPP

B9 - Dewatering applications and management methods:

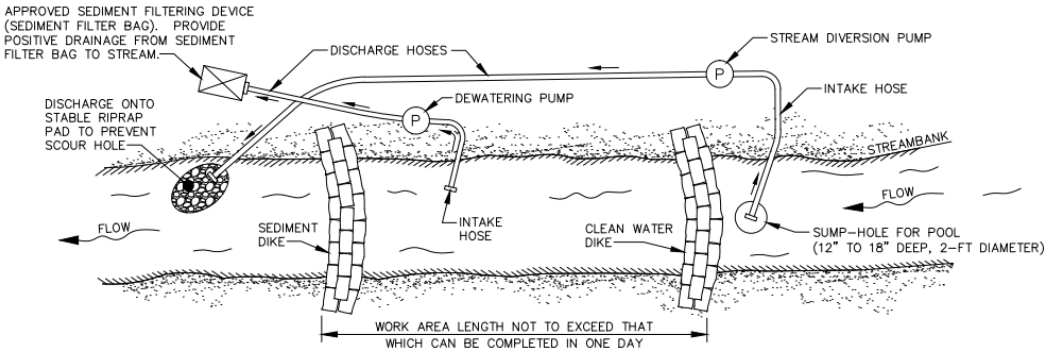
If dewatering activities are anticipated appropriate measures should be identified and included on the plans. This plan element is primarily associated with activities that include pumping of accumulated water associated with excavated areas.

If dewatering is planned or becomes necessary on site, identify the method or methods that will be used. As part of the plan, it may be useful to specify measures as a contingency in the event dewatering is required. Discharged water must be treated with an appropriate sediment control measure or measures, prior to discharge.

Other measures such as sediment basins and sediment traps or the use of flocculants should be considered components of items (B4) and (B5) above.

Solutions for Dewatering: Diversions

- Divert clean water, so sediment control is not needed
- Cofferdams, channels, flumes, pump arounds
- Typically used when working in stream
- Divert main channel via cofferdams, temporary channels, flumes, or a pump around

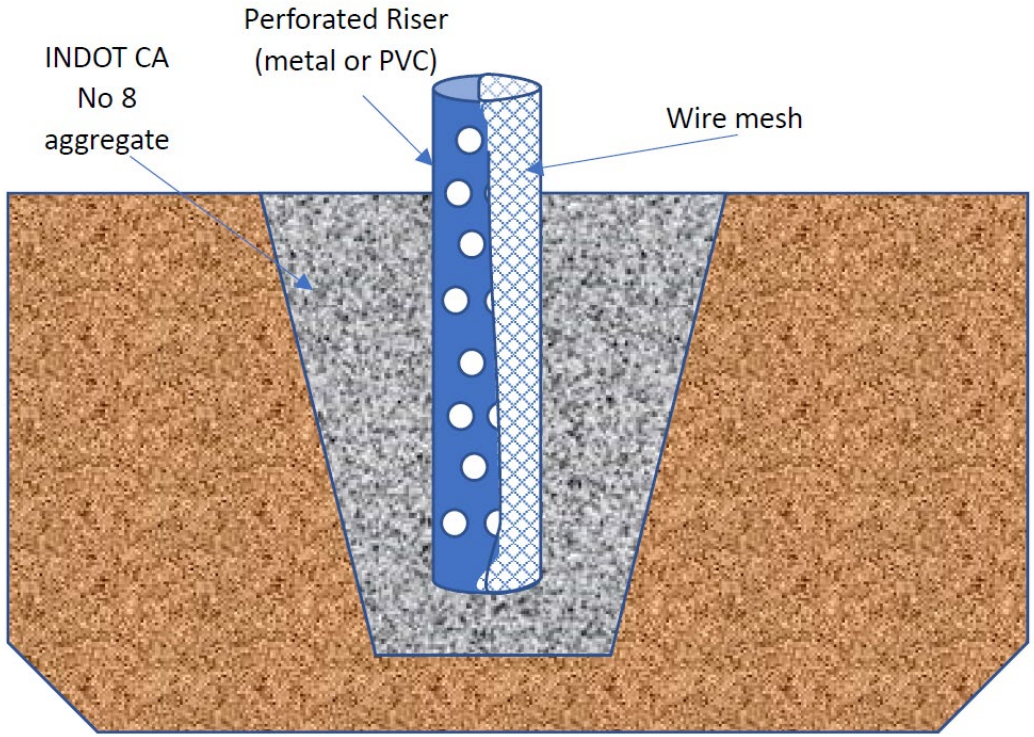


TEMPORARY PUMP AROUND SEQUENCE
1. SET UP PUMP WITH SUCTION AND DISCHARGE HOSE.
2. INSTALL UP–STREAM SANDBAG DAM.
3. INSTALL DOWN–STREAM SANDBAG DAM.
4. THE PUMP MUST RUN CONTINUOUSLY WHILE WORKING IN THE STREAM.
5. STREAMBANKS MUST BE STABILIZED AT THE END OF EACH DAY.

Solutions for Dewatering: Withdraw Water

- Intake placed in sump pit or floated

Solutions for Dewatering: Withdraw Water from Sump



Solutions for Dewatering: Float Pump Intake

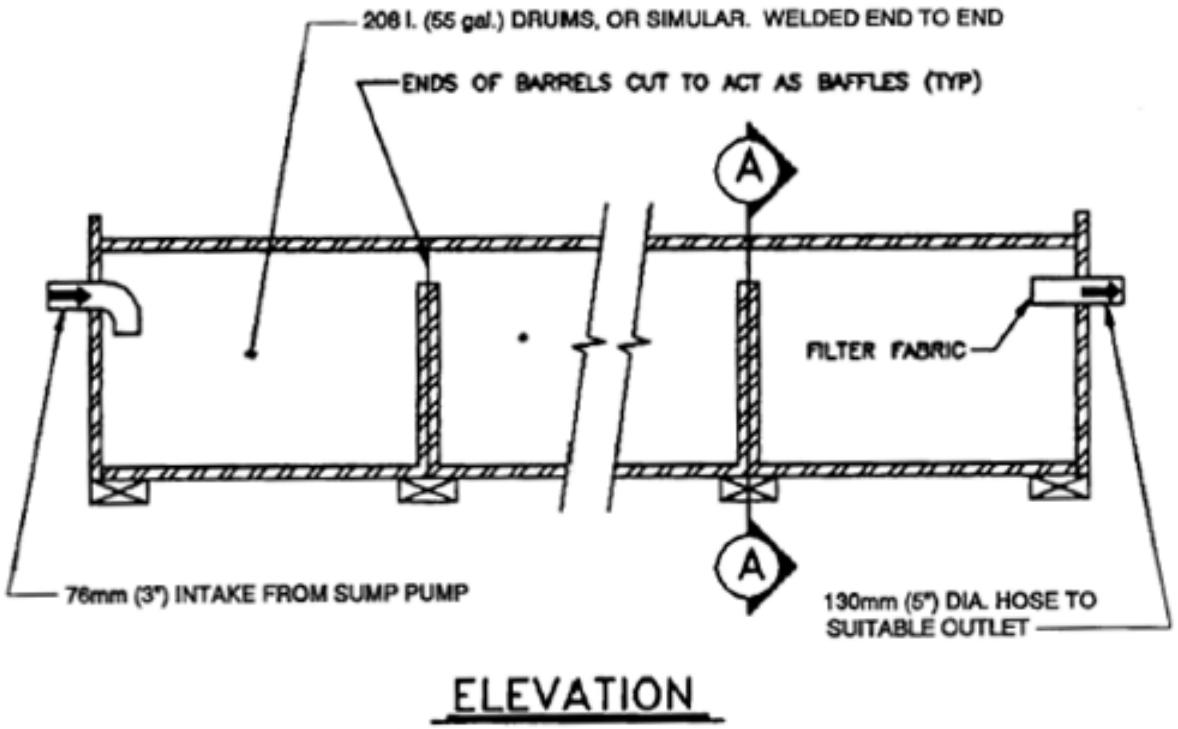
- Inlet hose is floated to withdraw water from within one foot of the water surface
- Least amount of sediment
- Do not float gasoline powered pumps on water
- Recommended to use containment around pump

Solutions for Dewatering: Containment

- Dewatering structure must be sized (and operated) appropriately
- Storage volume of containment structure:

  Pump Discharge (Gallons/min) × 16 = Cubic feet of storage required

Solutions for Dewatering: Containment Portable Sediment Tank



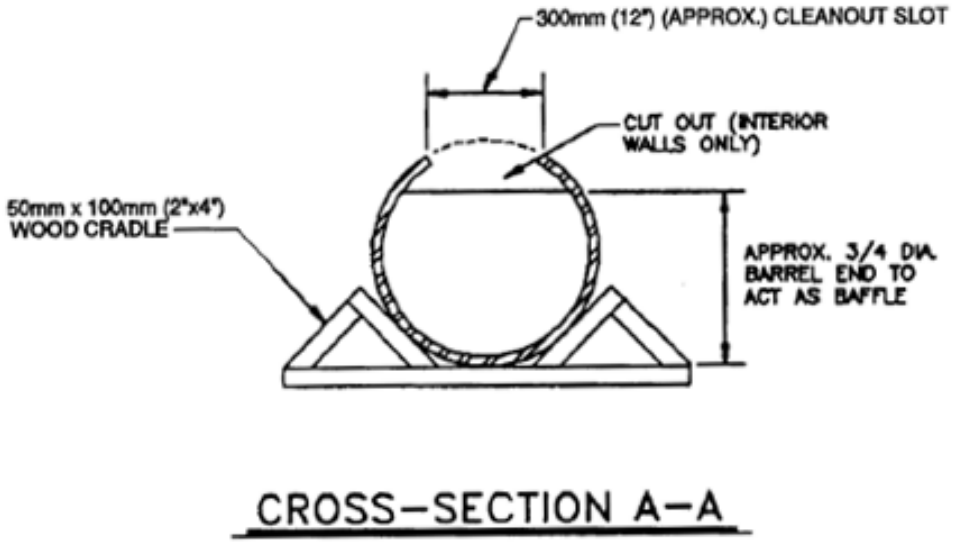
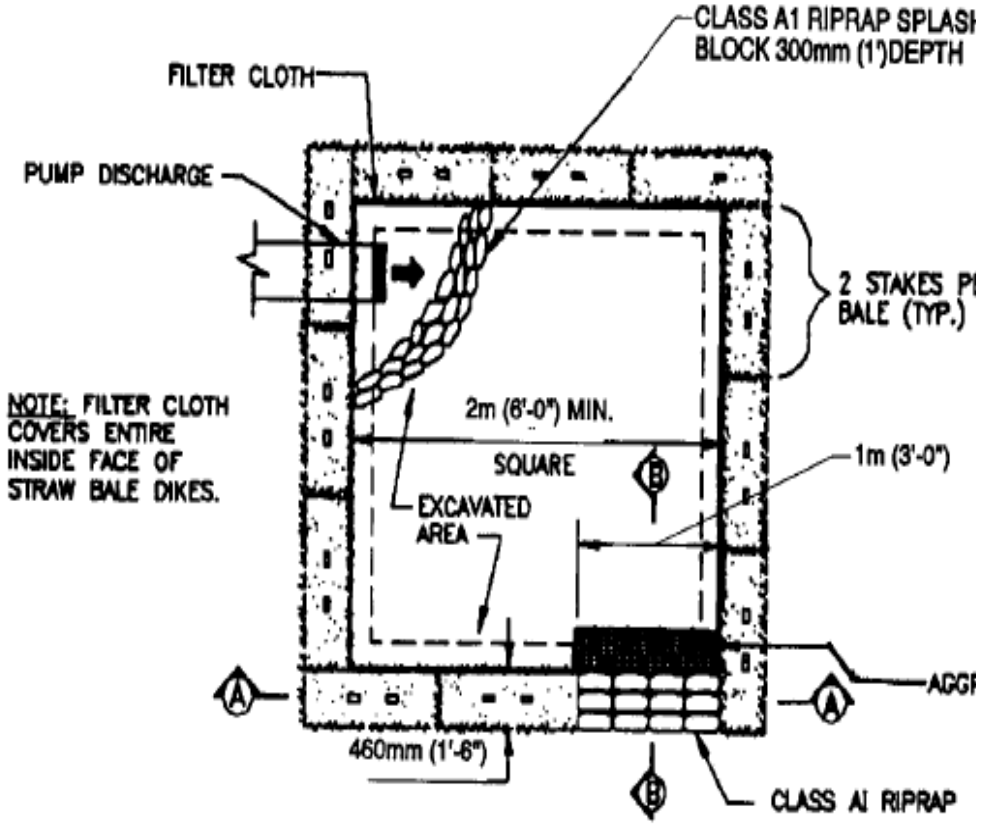
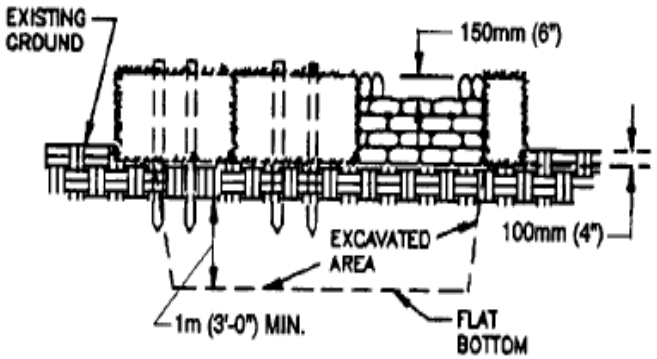


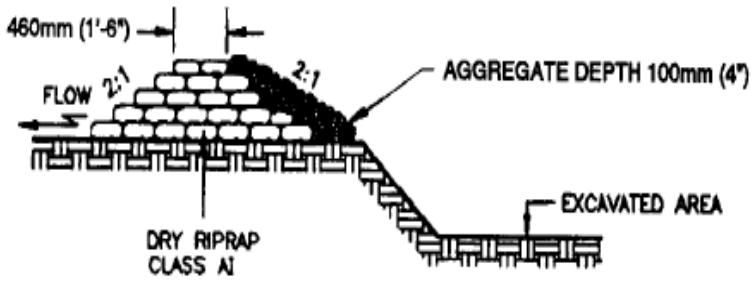
Figure CN-103-A
Portable Sediment Tank

Solutions for Dewatering: Containment Straw Bale/Silt Fence Pit





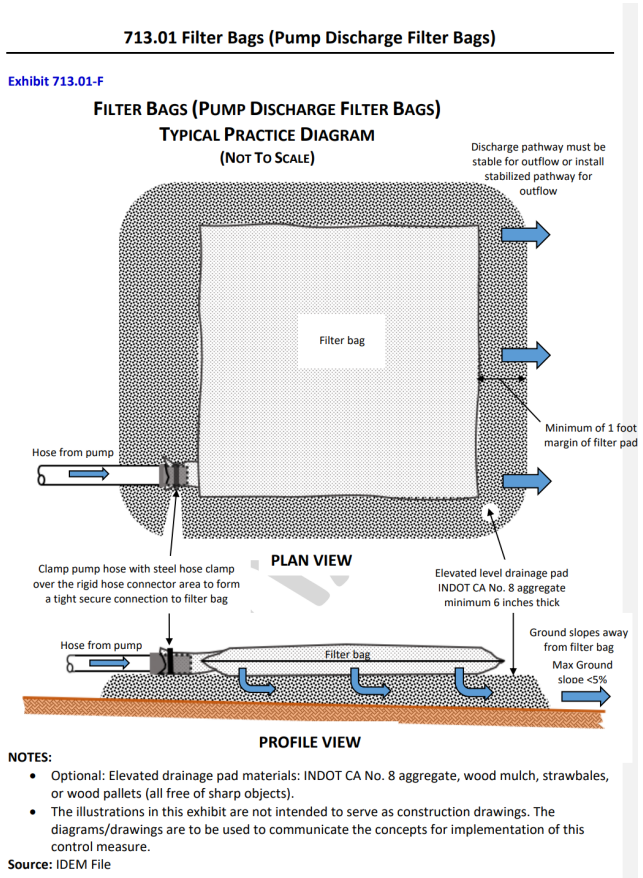
CROSS-SECTION A-A



CROSS-SECTION B-B

Solutions for Dewatering: Filtering

- Filter bag
- Filter box
- Treatment Train
- Combination containment and filtration



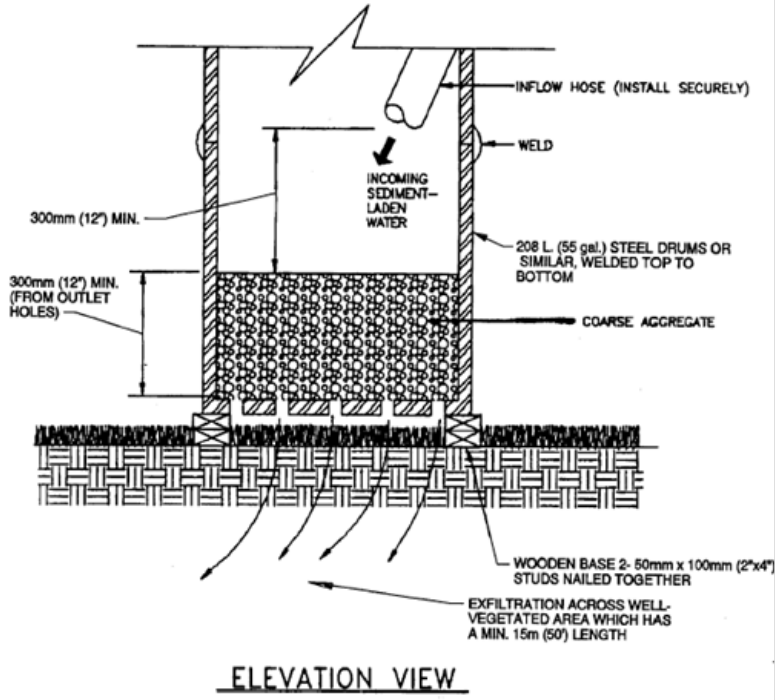


Figure CN-103-B

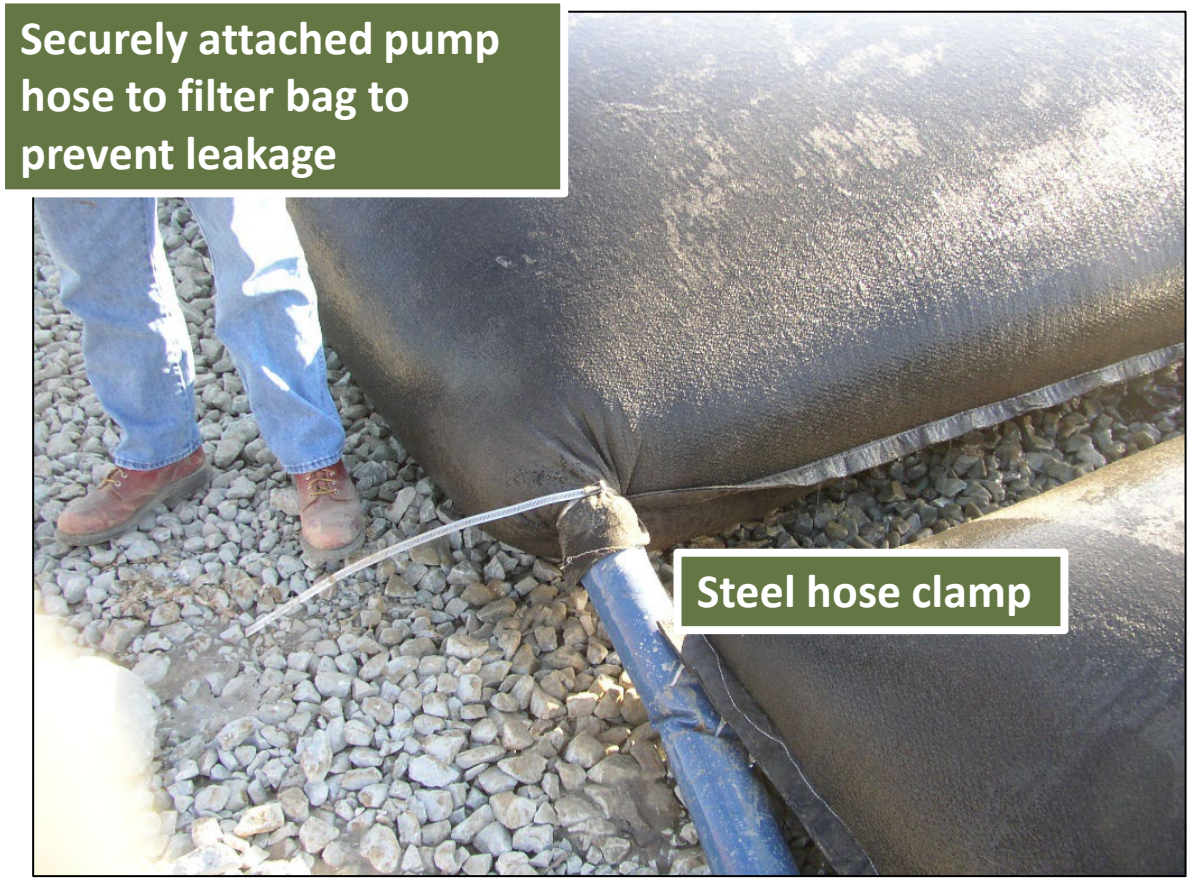
Solutions for Dewatering: Discharge Location

Solutions for Dewatering: Discharge Location

Properly sized bag
Secondary measure (silt fence and filter log)
Stable stone base

Discharge to flat stable surface
Grass adds filtration

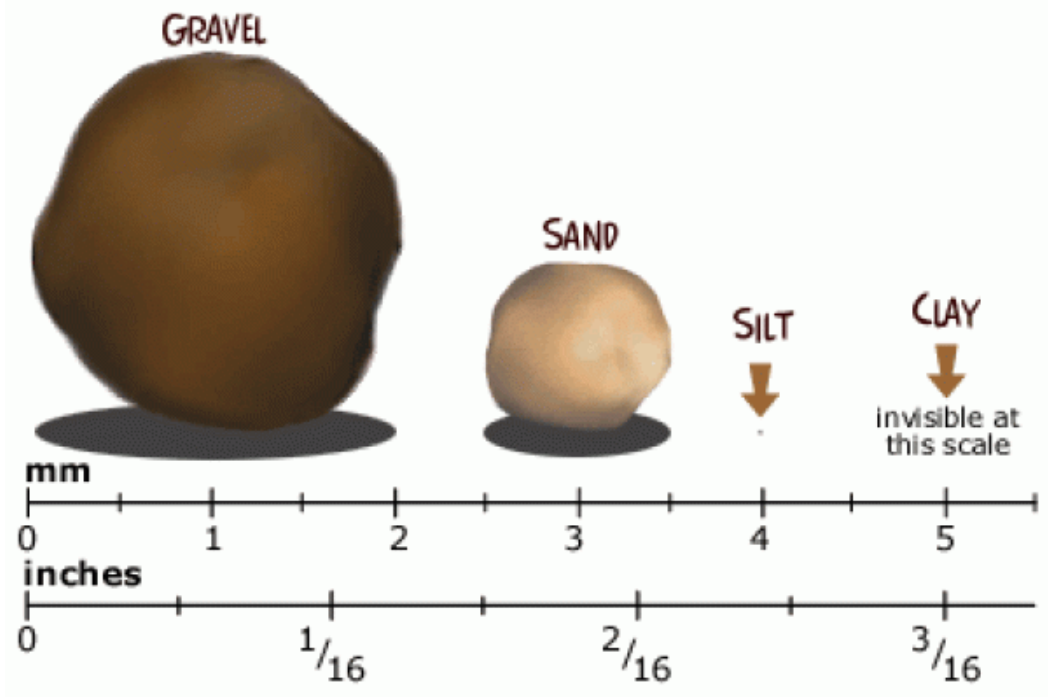
Solutions for Dewatering: Filtering



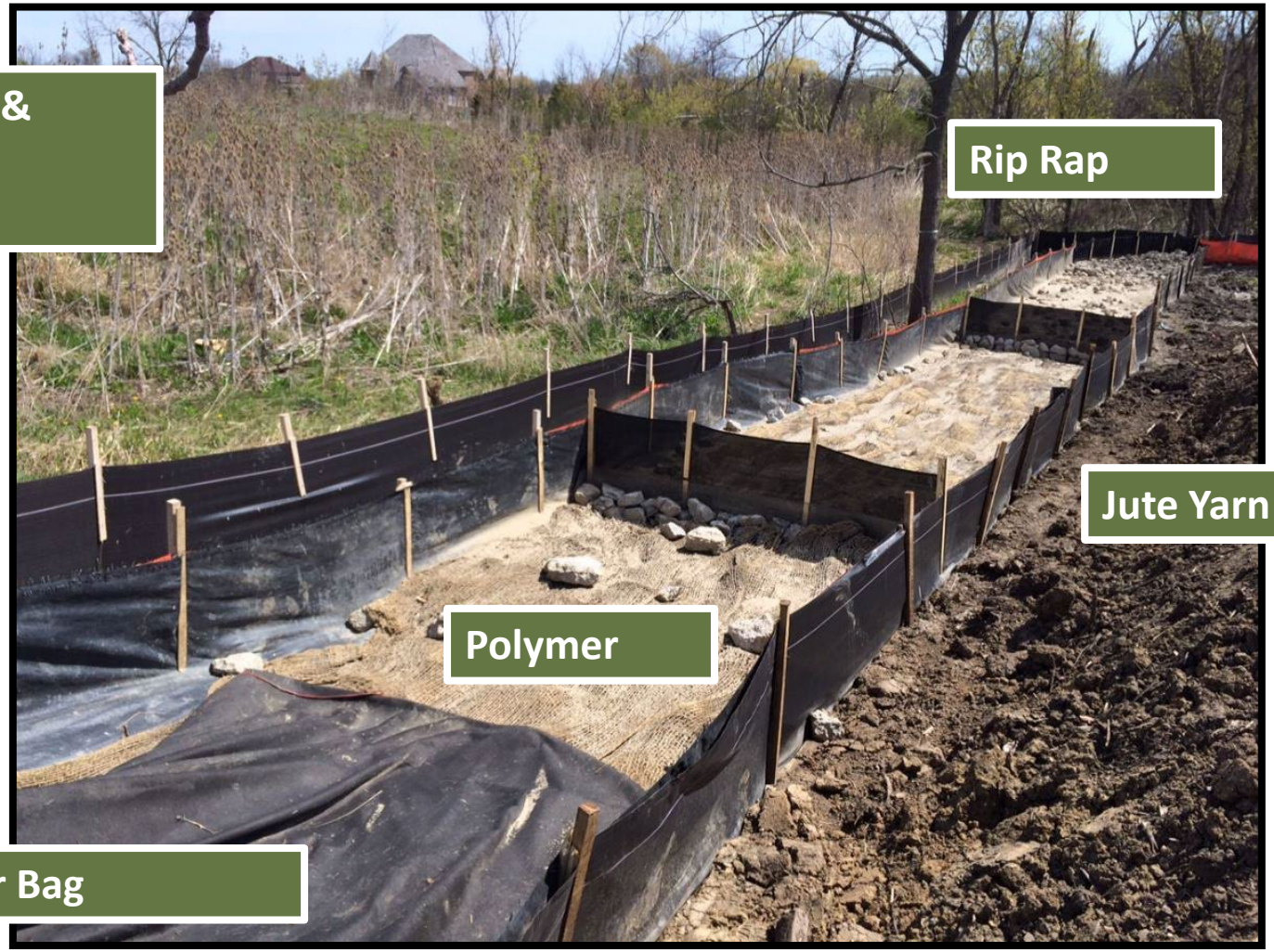
Solutions for Dewatering: Filtering

Solutions for Dewatering: Polymers

- Chemicals used to promote adhesion among soil particles
  - Aids sediment control measures by flocculating small particles into larger particles
  - Especially helpful with heavy silt and clay soils
  - Temporarily stabilizes soils
  - Also known as polyacrylamides (PAM)
  - Anionic (permitted under CSGP)
  - Cationic (**not** permitted under CSGP)
- Use of anionic polymers requires notification prior to use
  - Identified in the SWP3
  - Email notification to IDEM or the MS4



Solutions for Dewatering: Treatment Train



Solutions for Dewatering: Proprietary Measures

Solutions for Dewatering: Summary

- **Clean water** does not need to be directed to a sediment control measure, but it needs to outlet to an erosion resistant/energy dissipating surface. For example, clean water may include water diverted from stream or from wells being used to draw down water table) does not need to be treated,
- **Sediment-laden water** needs to be directed to a sediment control measure. For example, any water that has pooled in a disturbed area of a construction site, including ponds, ground water intrusion, rainwater that has pooled on the site, etc.
- Ponded water that has a visible sheen, color, odor, or pollutants other than sediment may require additional treatment and another permit prior to discharge. Dewatering operations should cease until pollutant levels are determined
- Intake hose should be floated or placed in a sump pit
- Containment: Sediment Trap, Sediment Basin, Frac Tank
- Filtration: Filter Bag, Treatment Train, Dewatering Tank/Flocculant System
- Outlet onto erosion resistant, energy-dissipating surface

Challenges and Solutions: Concrete Washout

CSGP Implementation Requirements 3.3(a)(7)
Appropriate measures must be implemented to eliminate wastes or unused building materials including, but limited to garbage, debris, cleaning wastes, wastewater, concrete or cementitious washout water, mortar/masonry products, soil stabilizers, lime stabilization materials, and other substances from being carried from a project site by run-off or wind. Wastes and unused building materials must be managed and disposed of in accordance with all applicable statutes and regulations

Challenges and Solutions: Concrete Washout

CSGP Appendix B

"Concrete washout" means the rinsing of chutes, pumps, curb and paving machines, hoppers, wheelbarrows, hand tools and any other equipment that are used to handle concrete, mortar, stucco, grout or other mixtures of cement. Concrete washout water is a wastewater slurry containing cementitious materials, metals and is caustic or corrosive, having a high pH.

Challenges and Solutions: Concrete Washout

Leak proof container (minimum 10 mil liner)

Signage

What happens when the washout is ¾ full?

Challenges and Solutions: Concrete Washout

Modified dumpster

Improvised liner clamps

10 mil liner extends over dumpster walls

Other considerations
- Height of dumpster
- Location of dumpster
- Signage

Photo source: Indiana Stormwater Quality Manual – Draft Measures

Challenges and Solutions: Concrete Washout

Mounted washwater recycling bucket

Aggregate can be dumped on ground

Other considerations

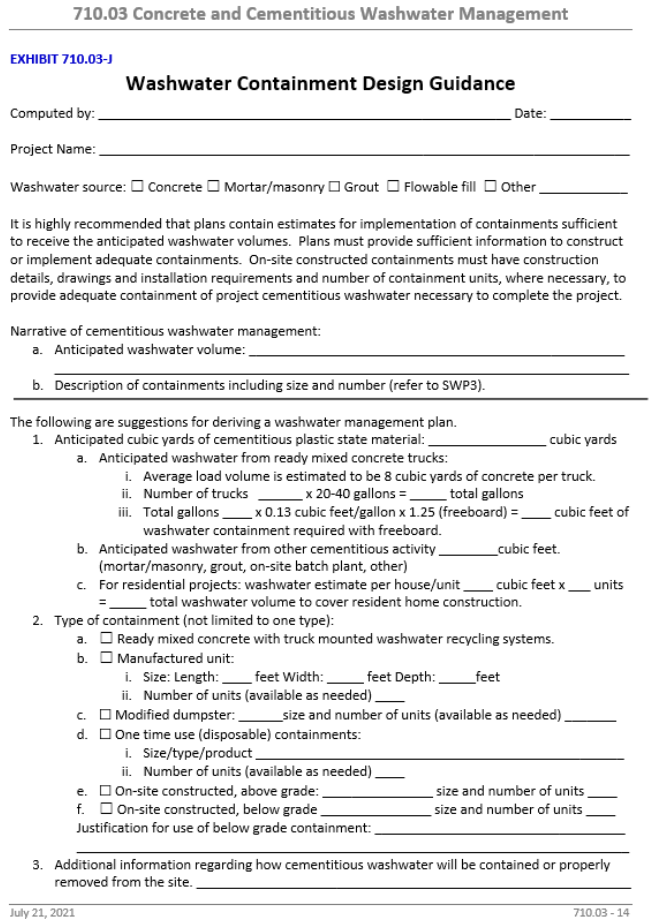
- Communication with concrete delivery company

Photo source: Indiana Stormwater Quality Manual – Draft Measures

Challenges and Solutions: Planning Concrete Washout

Estimating concrete washout volume example

- Pouring foundations and drives that requires 160 yards of concrete
- Given 8 cubic yards/truck, estimate that 20 concrete trucks will be needed
- 20-40 gal washout water per truck
- 40 gal/truck x 20 trucks x 0.13 x 1.25 = 130 cubic feet of washout
- 130 cubic feet = 4.8 cubic yards of washout
- Size your concrete washout containment appropriately



710.03 Concrete and Cementitious Washwater Management

EXHIBIT 710.03-J

Washwater Containment Design Guidance

Computed by: _____ Date: _____

Project Name: _____

Washwater source: ☐ Concrete ☐ Mortar/masonry ☐ Grout ☐ Flowable fill ☐ Other _____

It is highly recommended that plans contain estimates for implementation of containments sufficient to receive the anticipated washwater volumes. Plans must provide sufficient information to construct or implement adequate containments. On-site constructed containments must have construction details, drawings and installation requirements and number of containment units, where necessary, to provide adequate containment of project cementitious washwater necessary to complete the project.

Narrative of cementitious washwater management:

a. Anticipated washwater volume: _____

b. Description of containments including size and number (refer to SWP3).

The following are suggestions for deriving a washwater management plan.

1. Anticipated cubic yards of cementitious plastic state material: _____ cubic yards
   a. Anticipated washwater from ready mixed concrete trucks:
      i. Average load volume is estimated to be 8 cubic yards of concrete per truck.
      ii. Number of trucks _____ x 20-40 gallons = _____ total gallons
      iii. Total gallons ____ x 0.13 cubic feet/gallon x 1.25 (freeboard) = ____ cubic feet of washwater containment required with freeboard.
   b. Anticipated washwater from other cementitious activity _____cubic feet. (mortar/masonry, grout, on-site batch plant, other)
   c. For residential projects: washwater estimate per house/unit ____ cubic feet x ___ units = _____ total washwater volume to cover resident home construction.
2. Type of containment (not limited to one type):
   a. ☐ Ready mixed concrete with truck mounted washwater recycling systems.
   b. ☐ Manufactured unit:
      i. Size: Length: ____ feet Width: _____ feet Depth: _____feet
      ii. Number of units (available as needed) ____
   c. ☐ Modified dumpster: _____size and number of units (available as needed) _____
   d. ☐ One time use (disposable) containments:
      i. Size/type/product _____
      ii. Number of units (available as needed) ____
   e. ☐ On-site constructed, above grade: _____ size and number of units ____
   f. ☐ On-site constructed, below grade _____ size and number of units ____

   Justification for use of below grade containment: _____
3. Additional information regarding how cementitious washwater will be contained or properly removed from the site. _____

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Challenges and Solutions: Summary

- Disposal of concrete washout – evaporation or pumping
- Spraying down windshield
- Concrete "gum drops"
- Scraping the chute
- Mortar, masonry, and other trades
- Communication, communication, communication

Challenges and Solutions: Trash Management

CSGP 3.3(a)(8) Waste containers (trash receptacles), when selected to manage waste, must be managed to reduce the discharge of pollutants and blowing of debris. Receptacles that are not appropriately managed will require alternatives that include but are not limited to:

1) A cover (e.g. lid, tarp, plastic sheeting, temporary roof) to minimize exposure of wastes to precipitation or
2) A similarly effective method designed to minimize the discharge of pollutants

Challenges and Solutions: Trash Management

Blowing trash is quick way to have neighbors complain?

Trash in ponds can cause drainage issues at outlet structures

Challenges and Solutions: Trash Management

- **Pick up trash throughout the day and at a minimum at the end of the workday**
- **Training for workers** so that they know how to handle construction waste and their personal trash
- **Plan ahead and prepare** when you notice your dumpster is getting full, go ahead and call it in
- **Alternatives to dumpsters**
  - Plywood containment
  - Keeping trash indoors
  - Haul to dump
- **Cover the dumpsters** at the end of the workday
- **Avoid putting liquids in the dumpster** – not leak proof

Challenges and Solutions: Portable Toilets

Is this a good place to place the portalet?

Challenges and Solutions: Portable Toilets

Photo source: EPA Construction Inspection Training Course, Module 5

Questions?

Drew Gamble, CPESC
Resource Planner
dgamble@cbbel-in.com

Christopher B. Burke Engineering, LLC
www.cbbel-in.com
317-266-8000