

Contractors' Resource Book:

Stormwater Runoff, Erosion & Sediment Control Tools & Guidance



Developed by: The Tippecanoe County Partnership for Water Quality

www.tcpwq.org





TIPPECANOE COUNTY PARTNERSHIP FOR WATER QUALITY

C/O SURVEYOR'S OFFICE
20 N. THIRD STREET, LAFAYETTE, INDIANA 47901
765.423.9228

February 24, 2016

Dear Erosion & Sediment Control Professionals:

The Tippecanoe County Partnership for Water Quality (TCPWQ) seeks to partner with local, state, and federal government as well as other stakeholders to provide quality of life and protection of health, environment, and economy that our citizens desire and deserve as we serve as stewards of natural resources, system infrastructure, and public funds while solving stormwater and water quality issues. The Partnership consists of the following entities: Tippecanoe County, City of Lafayette, City of West Lafayette, Purdue University, Town of Battle Ground, Town of Dayton, and Ivy Tech Community College of Lafayette.

The TCPWQ was formed specifically to comply with the Indiana Department of Environmental Management's (IDEM) Rule 13 (327 IAC 15-13) Municipal Separate Storm Sewer System (MS4) permitting program. This state authorized, Clean Water Act program requires that all designated entities comply with the same set of requirements contained in Rule 13 including implementing a construction stormwater runoff control program. When entities such as our partnership members work together towards meeting these requirements, we can all save our tax and rate payers time, money, and resources.

Today we are proud to release our "Contractors' Resource Book" as a means to provide you with information, technical support, and contacts to assist with navigating the stormwater erosion and sediment control programs in Tippecanoe County. This "living" book will be periodically updated and placed on the TCPWQ website for convenient access.

If you have any questions or comments, I may be reached at 765-423-9228 or at zbeasley@tippecanoe.in.gov. I encourage you all to review the TCPWQ website at www.tcpwq.org in order to become better acquainted with our partnership, its activities, and accomplishments. On behalf of the TCPWQ, we greatly appreciate all that you do to help prevent pollution from reaching our local, precious water resources.

Sincerely,

Zachariah E. Beasley, P.L.S. / M.S.
Tippecanoe County Surveyor
TCPWQ/MS4 Coordinator

Cc: TCPWQ Partners

BATTLE
GROUND
765.567.4020

DAYTON
765.296.2533

IVY TECH
765.296.5128

LAFAYETTE
765.807.1036

PURDUE
UNIVERSITY
765.494.3417

TIPPECANOE
COUNTY
765.423.9228

WEST
LAFAYETTE
765.775.5130

The Wabash River, as well as, all the creeks and streams that feed it, are vital to maintaining an environmentally and economically viable community. As a resident, business owner, developer, or educator, there are opportunities to join with us to help enhance the quality of our water.

The focus of this Contractors' Resource Book is to provide adequate tools and resources for employees to perform the necessary measures required for their Storm Water Pollution Prevention Plan (SWPPP). Each construction site has a site specific SWPPP that the owner and contractors should be knowledgeable of and adhere to on a daily basis. This Book includes some of the tools necessary to complete those responsibilities.



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INSPECTORS' AND LOCAL ENTITIES' CONTACT INFORMATION

Entity	Contact Information
Tippecanoe County	<p>Dale Snipes, CISEC; Stormwater Coordinator Tippecanoe County Surveyor's Office 20 North Third Street Lafayette, Indiana 47901 765-423-9228 dsnipes@tippecanoe.in.gov</p>
	<p>Zachariah Beasley, P.L.S. / M.S. Surveyor, TCPWQ/MS4 Coordinator Tippecanoe County Surveyor's Office 20 North Third Street Lafayette, Indiana 47901 765-423-9228 zbeasley@tippecanoe.in.gov</p>
City of Lafayette	<p>Dale Chumley, CESSWI; Chief Storm Water Division City of Lafayette WPCD 1700 Wabash Avenue Lafayette, IN 47909 765-807-1800 dchumley@lafayette.in.gov</p>
	<p>Doug Smart, CESSWI, CISEC; Erosion Control Inspector City of Lafayette WPCD 1700 Wabash Avenue Lafayette, IN 47909 765-807-1800 wpcstormwater@lafayette.in.gov</p>
	<p>Angela Andrews, Assistant Superintendent, WPCD City of Lafayette WPCD 1700 Wabash Avenue Lafayette, IN 47909 765-807-1800 aandrews@lafayette.in.gov</p>
City of West Lafayette	<p>Michael Susong, P.E.; Assistant City Engineer City of West Lafayette 222 N. Chauncey Avenue, Room 102 West Lafayette, IN 47906 765-775-5130 msusong@westlafayette.in.gov</p>

Entity	Contact Information
Purdue University	<p>Jay DeMais, CESSWI, CESEC, PLS Purdue University 401 S. Grant Street West Lafayette, IN 47907 765-494-8004 jwdemais@purdue.edu</p>
	<p>James R. Knapp, PE, LEED® AP Senior Civil Engineer Purdue University Physical Facilities-Engineering Group 401 S. Grant St West Lafayette, IN 47907-2024 765-494-3417 jrknapp@purdue.edu</p>
Town of Battleground	<p>Ron Holladay, Town Supervisor 100 College Street PO Box 303 Battle Ground, IN 47920 765-567-4002 Ron@battleground.in.gov</p>
Town of Dayton	<p>Lanny Hahn, Town Manager Dayton Town Hall 721 Walnut St. Dayton, IN 47941 765-296-2533 daytontownmgr@intel.net</p>
Ivy Tech Community College Lafayette	<p>Donita Schroeder, Assistant Director for Maintenance 3101 South Creasy Lane Lafayette, IN 47905 765-269-5126 dschroeder3@ivytech.edu</p>

EROSION AND SEDIMENT CONTROL NATIONAL CERTIFICATION INFORMATION

EnviroCert International, INC.

- Certified Professional in Erosion & Sediment Control
(CPESC)
<http://www.cpesc.org/>
- Certified Erosion, Sediment, & Storm Water Inspector
(CESSWI)
<http://www.cpesc.org/>

CISEC, INC.

- Certified Inspector of Sediment and Erosion Control
(CISEC)
CISEC, Inc. <http://cisecinc.org/>

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INSPECTION AND MAINTENANCE FORMS

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Section B: BMP Installation

- S M U NA (1) Natural vegetation retained and protected.
- S M U NA (2) Areas within 35' of top of bank to water bodies undisturbed.
- S M U NA (3) Temporary seeding at areas inactive for 15 days or more.
- S M U NA (4) Rock check and/or straw dam installed properly.
- S M U NA (5) Storm drain inlets installed properly.
- S M U NA (6) Dewatering structure installed properly.
- S M U NA (7) Construction entrance/drive installed properly.
- S M U NA (8) Erosion control blankets installed properly.
- S M U NA (9) Concrete washout area properly installed and well marked.
- S M U NA (10) Rip rap installed properly.
- S M U NA (11) Perimeter control installed properly.
- S M U NA (12) Permanent seed and mulch areas at final grade.
- S M U NA (13) Sediment traps/basins and detention/retention basins properly shaped and stabilized.
- S M U NA (14) Natural/Sensitive area(s) protection installed properly.
- S M U NA (15) Flow diversion installed properly.
- S M U NA (16) Conveyance channels BMPs installed properly.
- S M U NA (17) Outlets and/or outfalls BMPs installed properly.
- S M U NA (18) Solid waste management implemented.
- S M U NA (19) Hazardous waste products properly stored in labeled containment.
- S M U NA (20) Spill equipment on-site with location marked and accessible.
- S M U NA (21) Spill prevention & response procedures posted with chemical storage.
- S M U NA (22) Other practice(s) _____

Comments: _____

Section C: BMP Maintenance

- S M U NA (1) Re-seeding done as needed.
- S M U NA (2) Rock check and/or straw dam maintained according to specs.
- S M U NA (3) Storm drain inlets maintained according to specs.
- S M U NA (4) Dewatering structure maintained according to specs.
- S M U NA (5) Construction entrance/drive maintained according to specs.
- S M U NA (6) Erosion control blankets maintained according to specs.
- S M U NA (7) Concrete washout area being used.
- S M U NA (8) Rip rap replaced as needed.
- S M U NA (9) Perimeter control maintained according to specs.
- S M U NA (10) Permanent seed and mulch areas maintained according to specs.
- S M U NA (11) Sediment traps/basins and detention/retention basins maintained according to specs.
- S M U NA (12) Chemical storage maintained according to specs.
- S M U NA (13) Areas near Natural/Sensitive area(s) maintained according to specs.
- S M U NA (14) Flow diversion installed maintained according to specs.
- S M U NA (15) Conveyance channel BMPs maintained according to specs.
- S M U NA (16) Outlet and/or outfall BMPs maintained according to specs.
- S M U NA (17) Roadways clear of accumulated sediment or tracked soil.
- S M U NA (18) No evidence of off-site sedimentation.
- S M U NA (19) Self-monitoring inspection records on-site and current.
- S M U NA (20) Other practice(s) _____

Comments: _____

Section D: BMP Adequacy

S M U NA (1) BMPs proposed in SWPPP are adequate and reflective of site conditions.

Comments: _____

BMP(s) modifications needed: _____

Section E: Inspection Follow Up

- Site appears to be in compliance at this point of the construction phase; continue to implement proper erosion and sediment control measures.
- All items marked as unsatisfactory must be corrected no later than ___/___/___.
- Additional BMP modifications must be installed and/or corrected no later than ___/___/___.
- Stormwater Pollution Prevention Plan needs to be revised or updated.
- Self-monitoring inspection forms must be kept with all Construction Permit documents/records.

LOCAL & STATE CODES GOVERNING STORMWATER RUNOFF AND EROSION & SEDIMENT CONTROL

STATE

Indiana Department of Environmental Management (IDEM)

NPDES Stormwater Construction General Permit:

Rule 5 (327 IAC 15-5) - <http://www.in.gov/idem/5912.htm>

LOCAL

City of Lafayette Storm Water Code Chapter 8.08

https://www.municode.com/library/in/lafayette/codes/municipal_code?nodeId=TIT8STSISTSE_CH8.08CILASTCO

City of West Lafayette Chapter 116

https://www.municode.com/library/in/west_lafayette/codes/code_of_ordinances?nodeId=CH_116

Tippecanoe County Storm Water Ordinance Chapter 4

http://www.tippecanoe.in.gov/egov/documents/1325709403_651123.pdf

Purdue University – follows University policy or Rule 5

Ivy Tech Community College – follows City of Lafayette or Rule 5

Town of Battleground – follows Tippecanoe County or Rule 5

Town of Dayton – follows Tippecanoe County or Rule 5

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CITY OF LAFAYETTE ARTICLE IV.

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City of Lafayette Ordinance Excerpt – Article IV

- **Article IV. - Stormwater Pollution Prevention for Construction Sites**
- **8.08.400 - Applicability and exemptions.**

The city of Lafayette will require a Stormwater Pollution Prevention Plan (SWPPP), which includes erosion and sediment control measures and materials handling procedures, to be submitted as part of the construction plans and specifications for each project subject to the requirements of this chapter. Any project located within city of Lafayette that includes clearing, grading, excavation, and other land disturbing activities, resulting in the disturbance of one-half acre or more of total land area, is subject to the requirements of this chapter. This includes both new development and re-development. This chapter also applies to disturbances of less than one-half acre of land that are part of a larger common plan of development or sale if the larger common plan will ultimately disturb one-half or more acres of land, within the MS4 area. Section 8.08.420 provides guidelines for calculating land disturbance.

The requirements under this chapter do not apply to the following activities:

- A. Agricultural land disturbing activities; or
- B. Forest harvesting activities.

The requirements under this chapter do not apply to the following activities, provided other applicable state permits contain provisions requiring immediate implementation of soil erosion control measures:

- A. Landfills that have been issued a certification of closure under 329 IAC 10.
- B. Coal mining activities permitted under IC 14-34.
- C. Municipal solid waste landfills that are accepting waste pursuant to a permit issued by the Indiana Department of Environmental Management under 329 IAC 10 that contains equivalent stormwater requirements, including the expansion of landfill boundaries and construction of new cells either within or outside the original solid waste permit boundary.

For an individual lot where land disturbance is expected to be one-half acre or more, the individual lot owner must complete their own notice of intent letter, apply for a stormwater permit from the city of Lafayette, and ensure that a sufficient construction and stormwater pollution prevention plan is completed and submitted in accordance with Article VI of this chapter, regardless of whether the individual lot is part of a larger permitted project site.

An individual lot with land disturbance less than ½ acre, located within a larger permitted project site, is considered part of the larger permitted project site, and the

individual lot operator must comply with the terms and conditions of the stormwater permit approved for the larger project site. The stormwater permit application for the larger project site must include detailed erosion and sediment control measures for individual lots. These individual lots are not required to submit their own stormwater permit application, but must obtain a stormwater review approval prior to receiving a building permit. Details of the permitting process are contained in Article VI.

It will be the responsibility of the project site owner to complete a stormwater permit application and ensure that a sufficient construction plan is completed and submitted to the city of Lafayette in accordance with Article VI of this chapter. It will be the responsibility of the project site owner to ensure compliance with this chapter during the construction activity and implementation of the construction plan, until the city of Lafayette receives and approves a notice of termination. However, all persons engaging in construction and land disturbing activities on a permitted project site meeting the applicability requirements must comply with the requirements of this chapter and this code.

(Ord. 2008-03 § 2 (part), 2-4-08; Ord. No. 2011-27, § 6, 12-5-11)

- **8.08.410 - Policy on stormwater pollution prevention.**

Effective stormwater pollution prevention on construction sites is dependent on a combination of preventing movement of soil from its original position (erosion control), intercepting displaced soil prior to entering a waterbody (sediment control), and proper on-site materials handling. The developer must submit to the city of Lafayette, a SWPPP with detailed erosion and sediment control plans as well as a narrative describing materials handling and storage, and construction sequencing. The following principles apply to all land-disturbing activities and should be considered in the preparation of a Stormwater Pollution Prevention Plan within city of Lafayette.

- A. Minimize the potential for soil erosion by designing a development that fits the topography and soils of the site. Deep cuts and fills in areas with steep slopes should be avoided wherever possible, and natural contours should be followed as closely as possible.
- B. Existing natural vegetation should be retained and protected wherever possible. Areas immediately adjacent (within thirty-five (35) feet of top of bank) to watercourses and lakes also should be left undisturbed wherever possible. Unvegetated areas or vegetated areas with less than seventy (70) percent cover that are scheduled or likely to be left inactive for fifteen (15) days or more must be temporarily or permanently stabilized with measures appropriate for the season to reduce erosion potential. Alternative measures to site stabilization may be acceptable if the project site owner or their representative can demonstrate they have implemented and maintained erosion and sediment control measures adequate to prevent sediment discharge from the inactive area.

- C. All activities on a site should be conducted in a logical sequence so that the smallest practical area of land will be exposed for the shortest practical period of time during development.
- D. The length and steepness of designed slopes should be minimized to reduce erosion potential. Drainage channels and swales must be designed and adequately protected so that their final gradients and resultant velocities will not cause erosion in the receiving channel or at the outlet. Methods for determining acceptable velocities are included in the city of Lafayette Stormwater Technical Standards Manual.
- E. Sediment-laden water which otherwise would flow from the project site shall be treated by erosion and sediment control measures appropriate to minimize sedimentation. A stable construction site access shall be provided at all points of construction traffic ingress and egress to the project site.
- F. Appropriate measures shall be implemented to prevent wastes or unused building materials, including, garbage, debris, packaging material, fuels and petroleum products, hazardous materials or wastes, cleaning wastes, wastewater, concrete truck washout, and other substances from being carried from a project site by runoff or wind. Identification of areas where concrete truck washout is permissible must be clearly posted at appropriate areas of the site. Wastes and unused building materials shall be managed and disposed of in accordance with all applicable state statutes and regulations. Proper storage and handling of materials such as fuels or hazardous wastes, and spill prevention and cleanup measures shall be implemented to minimize the potential for pollutants to contaminate surface or ground water or degrade soil quality.
- G. Public or private roadways shall be kept cleared of accumulated sediment that is a result of runoff or tracking. Bulk clearing of accumulated sediment shall not include flushing the area with water. Cleared sediment shall be redistributed or disposed of in a manner that is in accordance with all applicable statutes and regulations.
- H. Collected runoff leaving a project site must be either discharged directly into a well-defined, stable receiving channel, or diffused and released to adjacent property without causing an erosion or pollutant problem to the adjacent property owner.
- I. Natural features, including wetlands, shall be protected from pollutants associated with stormwater runoff.

(Ord. 2008-03 § 2 (part), 2-4-08)

- **8.08.420 - Calculations and design standards and specifications.**

In calculating the total area of land disturbance, for the purposes of determining applicability of this chapter to the project, the following guidelines shall be used:

- A. Off-site construction activities that provide services (for example, road extensions, sewer, water, and other utilities) to a land disturbing project site, must be considered as a part of the total land disturbance calculation for the project site, when the activity is under the control of the project site owner.

- B. Strip developments will be considered as one project site and must comply with this chapter unless the total combined disturbance on all individual lots is less than one-half acre and is not part of a larger common plan of development or sale.
- C. To determine if multi-lot project sites are regulated by this rule, the area of land disturbance shall be calculated by adding the total area of land disturbance for improvements, such as, roads, utilities, or common areas, and the expected total disturbance on each individual lot, as determined by the following:
 - 1. For a single-family residential project site where the lots are one-half acre or more, one-half acre of land disturbance must be used as the expected lot disturbance.
 - 2. For a single-family residential project site where the lots are less than one half acre in size, the total lot must be calculated as being disturbed.
 - 3. To calculate lot disturbance on all other types of projects sites, such as industrial and commercial projects project sites, a minimum of one-half acre of land disturbance must be used as the expected lot disturbance, unless the lots are less than one-half acre in size, in which case the total lot must be calculated as being disturbed.

The calculation methods as well as the type, sizing, and placement of all stormwater pollution prevention measures for construction sites shall meet the design criteria, standards, and specifications outlined in the Indiana Stormwater Quality Manual or the Technical Standards. The methods and procedures included in these two references are in keeping with the above stated policy and meet the requirements of IDEM's Rule 5.

(Ord. 2008-03 § 2 (part), 2-4-08; Ord. No. 2011-27, § 7, 12-5-11)

- **8.08.430 - Inspection, maintenance, record keeping, and reporting.**

Following approval of the stormwater management permit by the city of Lafayette and commencement of construction activities, the City Engineer has the authority to conduct inspections of the site to insure full compliance with the provisions of this article, the Indiana Stormwater Quality Manual, and the terms and conditions of the approved permit.

A self-monitoring program must be implemented by the project site owner to insure the stormwater pollution prevention plan is working effectively. A trained individual as defined in the Technical Standards, shall perform a written evaluation of the project site by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Weekly inspections shall continue until the entire site has been stabilized and a notice of termination has been issued. The inspector should look at maintenance of existing stormwater pollution prevention measures, including erosion and sediment control measures, drainage studies, and construction materials storage/containment facilities, to ensure they are functioning properly. The inspector should also identify additional measures, beyond those originally identified in the stormwater pollution prevention plan, necessary to remain in compliance with all applicable statutes and regulations.

The resulting evaluation reports must include the name of the individual performing the evaluation, the date of the evaluation, problems identified at the project site, and details of maintenance, additional measures, and corrective actions recommend and completed. A form for documenting these inspections can be found in Appendix B of the Technical Standard.

The stormwater pollution prevention plan shall serve as a guideline for stormwater quality, but should not be interpreted to be the only basis for implementation of stormwater quality measures for a project site. The project site owner is responsible for implementing, in accordance with this article, all measures necessary to adequately prevent polluted stormwater runoff. Recommendations by the inspector for modified stormwater quality measures should be implemented.

Although self-monitoring reports do not need to be submitted to the city of Lafayette, the city of Lafayette has the right to request complete records of maintenance and monitoring activities involving stormwater pollution prevention measures. All evaluation reports for the project site must be made available to the city of Lafayette, in an organized fashion, within forty-eight (48) hours of a request.

(Ord. 2008-03 § 2 (part), 2-4-08; Ord. No. 2011-27, § 8, 12-5-11)

CITY OF WEST LAFAYETTE ARTICLE IV.

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City of West Lafayette Ordinance Excerpt – Article IV

Article IV. Stormwater Pollution Prevention for Construction Sites (Ord. No. 27-11)

Sec. 116.401. Applicability and Exemptions

The City of West Lafayette will require a Stormwater Pollution Prevention Plan (SWPPP), which includes erosion and sediment control measures and materials handling procedures, to be submitted as part of the construction plans and specifications. Any project located within the City of West Lafayette that includes clearing, grading, excavation, and other land disturbing activities, resulting in the disturbance of one-half (0.5) acre or more of total land area, is subject to the requirements of this article. This includes both new development and re-development. This article also applies to disturbances of less than one-half (0.5) acre of land that are part of a larger common plan of development or sale if the larger common plan will ultimately disturb one-half (0.5) or more acres of land, within the MS4 area. Section 116.403 of this article provides guidelines for calculating land disturbance.

The requirements under this article do not apply to the following activities:

- agricultural land disturbing activities; or
- forest harvesting activities.

The requirements under this article do not apply to the following activities, provided other applicable state permits contain provisions requiring immediate implementation of soil erosion control measures:

- Landfills that have been issued a certification of closure under 329 IAC 10.
- Coal mining activities permitted under IND. CODE article 14-34.
- Municipal solid waste landfills that are accepting waste pursuant to a permit issued by the Indiana Department of Environmental Management under 329 IAC 10 that contains equivalent stormwater requirements, including the expansion of landfill boundaries and construction of new cells either within or outside the original solid waste permit boundary.

For an individual lot where land disturbance is expected to be one-half (0.5) acre or more, the individual lot owner must complete their own notice of intent letter, apply for a stormwater permit from the City of West Lafayette, and ensure that a sufficient construction and stormwater pollution prevention plan is completed and submitted in accordance with article VI of this code, regardless of whether the individual lot is part of a larger permitted project site.

An individual lot with land disturbance less than one-half (0.5) acre, located within a larger permitted project site, is considered part of the larger permitted project site, and the individual lot operator must comply with the terms and conditions of the stormwater permit approved for the larger project site. The stormwater permit application for the larger project site must include detailed erosion and sediment control measures for individual lots. These individual lots are not required to submit their own stormwater permit application, but must obtain a stormwater review approval prior to receiving a building permit. Details of the permitting process are contained in article VI.

It will be the responsibility of the project site owner to complete a stormwater permit application and ensure that a sufficient construction plan is completed and submitted to the City Engineer in accordance with article VI of this code. It will be the responsibility of the project site owner to ensure compliance with this code during the construction activity and implementation of the construction plan, until the City of West Lafayette receives and approves a Notice of Termination. However, all persons engaging in construction and land disturbing activities on a permitted project site meeting the applicability requirements must comply with the requirements of this article and this code and the approved permit and plan.

Sec. 116.402. Policy on Stormwater Pollution Prevention

Effective stormwater pollution prevention on construction sites is dependent on a combination of preventing movement of soil from its original position (erosion control), intercepting displaced soil prior to entering a waterbody (sediment control), and proper on-site materials handling. The developer must submit to the City of West Lafayette, a Stormwater Pollution Prevention Plan (SWPPP) with detailed erosion and sediment control plans as well as a narrative describing materials handling and storage, and construction sequencing. The following principles apply to all land-disturbing activities and should be considered in the preparation of a SWPPP within the City of West Lafayette.

(a) Minimize the potential for soil erosion by designing a development that fits the topography and soils of the site. Deep cuts and fills in areas with steep slopes should be avoided wherever possible, and natural contours should be followed as closely as possible.

(b) Existing natural vegetation shall be retained and protected wherever possible. Areas immediately adjacent (within 35 feet of top of bank) to watercourses and lakes also should be left undisturbed wherever possible. Unvegetated areas or vegetated areas with less than 70% cover that are scheduled or likely to be left inactive for 15 days or more must be temporarily or permanently stabilized with measures appropriate for the season to reduce erosion potential. Alternative measures to site stabilization may be acceptable if the project site owner or their representative can demonstrate they have implemented and maintained erosion and sediment control measures adequate to prevent sediment discharge from the inactive area.

(c) All activities on a site should be conducted in a logical sequence so that the smallest practical area of land will be exposed for the shortest practical period of time during development.

(d) The length and steepness of designed slopes should be minimized to reduce erosion potential. Drainage channels and swales must be designed and adequately protected so that their final gradients and resultant velocities will not cause erosion in the receiving channel or at the outlet. Methods for determining acceptable velocities are included in the West Lafayette Stormwater Technical Standards.

(e) Sediment-laden water which otherwise would flow from the project site shall be treated by erosion and sediment control measures appropriate to minimize sedimentation. A stable construction site access shall be provided at all points of construction traffic ingress and egress to the project site.

(f) Appropriate measures shall be implemented to prevent wastes or unused building materials, including, garbage, debris, packaging material, fuels and petroleum products, hazardous materials or wastes, cleaning wastes, wastewater, concrete truck washout, and other substances from being carried from a project site by runoff or wind. Identification of areas where concrete truck washout is permissible must be clearly posted at appropriate areas of the site. Wastes and unused building materials shall be managed and disposed of in accordance with all applicable State statutes and regulations. Proper storage and handling of materials such as fuels or hazardous wastes, and spill prevention and cleanup measures shall be implemented to minimize the potential for pollutants to contaminate surface or ground water or degrade soil quality.

(g) Public or private roadways shall be kept cleared of accumulated sediment that is a result of runoff or tracking. Bulk clearing of accumulated sediment shall not include flushing the area with water. Cleared sediment shall be redistributed or disposed of in a manner that is in accordance with all applicable statutes and regulations.

(h) Collected runoff leaving a project site must be either discharged directly into a well-defined, stable receiving channel, or diffused and released to adjacent property without causing an erosion or pollutant problem to the adjacent property owner.

(i) Natural features, including wetlands, shall be protected from pollutants associated with stormwater runoff.

(j) The SWPPP shall designate a paved or stoned area(s) for parking during construction to prevent site disturbance and the permittee shall require all contractors, subcontractors, material suppliers, and deliveries to use only the designated parking area(s).

Sec. 116.403. Calculations, Design Standards and Specifications

In calculating the total area of land disturbance, for the purposes of determining applicability of this article to the project, the following guidelines shall be used:

(a) Off-site construction activities that provide services (for example, road extensions, sewer, water, and other utilities) to a land disturbing project site, must be considered as a part of the total land disturbance calculation for the project site, when the activity is under the control of the project site owner.

(b) Strip developments will be considered as one (1) project site and must comply with this article unless the total combined disturbance on all individual lots is less than one-half (0.5) acre and is not part of a larger common plan of development or sale.

(c) To determine if multi-lot project sites are regulated by this rule, the area of land disturbance shall be calculated by adding the total area of land disturbance for improvements, such as, roads, utilities, or common areas, and the expected total disturbance on each individual lot, as determined by the following:

(1) For a single-family residential project site where the lots are one-half (0.5) acre or more, one-half (0.5) acre of land disturbance must be used as the expected lot disturbance.

(2) For a single-family residential project site where the lots are less than one half (0.5) acre in size, the total lot must be calculated as being disturbed.

(3) To calculate lot disturbance on all other types of projects sites, such as industrial and commercial projects project sites, a minimum of one-half (0.5) acre of land disturbance must be used as the expected lot disturbance, unless the lots are less than one-half (0.5) acre in size, in which case the total lot must be calculated as being disturbed.

The calculation methods as well as the type, sizing, and placement of all stormwater pollution prevention measures for construction sites shall meet the design criteria, standards, and specifications outlined in the Indiana Stormwater Quality Manual or the Technical Standards. The methods and procedures included in these two references are in keeping with the above stated policy and meet the requirements of IDEM's Rule 5.

Sec. 116.404. Inspection, Maintenance, Record Keeping, and Reporting

Following approval of the stormwater management permit by the City of West Lafayette and commencement of construction activities, the City Engineer has the authority to conduct inspections of the site to insure full compliance with the provisions of this article, the Indiana Stormwater Quality Manual, and the terms and conditions of the approved permit.

A self-monitoring program must be implemented by the project site owner to insure the stormwater pollution prevention plan is working effectively. A trained individual, as defined in the Technical Standards, shall perform a written evaluation of the project site by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Weekly

inspections shall continue until the entire site has been stabilized and a Notice of Termination has been issued. The inspector should look at the maintenance of existing stormwater pollution prevention measures, including erosion and sediment control measures, drainage structures, and construction materials storage/containment facilities, to ensure they are functioning properly. The inspector shall also identify additional measures, beyond those originally identified in the stormwater pollution prevention plan, necessary to remain in compliance with all applicable statutes and regulations.

The resulting evaluation reports must include the name of the individual performing the evaluation, the date of the evaluation, problems identified at the project site, and details of maintenance, additional measures, and corrective actions recommended and completed. A form for documenting these inspections can be found in Appendix B of the Technical Standard.

The stormwater pollution prevention plan shall serve as a guideline for stormwater quality, but should not be interpreted to be the only basis for implementation of stormwater quality measures for a project site. The project site owner is responsible for implementing, in accordance with this article, all measures necessary to adequately prevent polluted stormwater runoff. Recommendations by the inspector for modified stormwater quality measures should be implemented.

Although self-monitoring reports do not need to be submitted to the City Engineer, the City Engineer has the right to request complete records of maintenance and monitoring activities involving stormwater pollution prevention measures. All evaluation reports for the project site must be made available to the City Engineer, in an organized fashion, within forty-eight (48) hours of a request.

TIPPECANOE COUNTY ARTICLE 4

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CHAPTER FOUR

**STORMWATER POLLUTION PREVENTION
FOR CONSTRUCTION SITES**

1. APPLICABILITY AND EXEMPTIONS

The Tippecanoe County Drainage Board will require a Stormwater Pollution Prevention Plan (SWPPP), which includes erosion and sediment control measures and materials handling procedures, to be submitted as part of the construction plans and specifications for each project subject to the requirements of this chapter. Any project located within Tippecanoe County that includes clearing, grading, excavation, and other land disturbing activities, resulting in the disturbance of 1 acre or more of total land area, is subject to the requirements of this chapter. This includes both new development and re-development. This chapter also applies to disturbances of less than one 1 acre of land that are part of a larger common plan of development or sale if the larger common plan will ultimately disturb one (1) or more acres of land, within the MS4 area. Section 3 of this chapter provides guidelines for calculating land disturbance.

The requirements under this chapter do not apply to the following activities:

- a. agricultural land disturbing activities; or
- b. forest harvesting activities.

The requirements under this chapter do not apply to the following activities, provided other applicable state permits contain provisions requiring immediate implementation of soil erosion control measures:

- a. Landfills that have been issued a certification of closure under 329 IAC 10.
- b. Coal mining activities permitted under IC 14-34.
- c. Municipal solid waste landfills that are accepting waste pursuant to a permit issued by the Indiana Department of Environmental Management under 329 IAC 10 that contains equivalent stormwater requirements, including the expansion of landfill boundaries and construction of new cells either within or outside the original solid waste permit boundary.

For an individual lot where land disturbance is expected to be one (1) acre or more, the individual lot owner must complete their own notice of intent letter, apply for a stormwater permit from the Tippecanoe County Drainage Board, and ensure that a sufficient construction and stormwater pollution prevention plan is completed and submitted in accordance with Chapter 6 of this Ordinance, regardless of whether the individual lot is part of a larger permitted project site.

An individual lot with land disturbance less than one (1) acre, located within a larger permitted project site, is considered part of the larger permitted project site, and the individual lot operator must comply with the terms and conditions of the stormwater permit approved for the larger project site. The stormwater permit application for the larger project site must include detailed erosion and sediment control measures for individual lots. These individual lots are not required to submit their own stormwater permit application, but must obtain a stormwater review approval prior to receiving a building permit. Details of the permitting process are contained in Chapter 6.

It will be the responsibility of the project site owner to complete a stormwater permit application and ensure that a sufficient construction plan is completed and submitted to the Tippecanoe County Drainage Board in accordance with Chapter 6 of this Ordinance. It will be the responsibility of the project site owner to ensure compliance with this Ordinance during the construction activity and implementation of the construction plan, and to notify the Tippecanoe County Drainage Board with a sufficient notice of termination letter upon completion of the project and stabilization of the site. However, all persons engaging in construction and land disturbing activities on a permitted project site meeting the applicability requirements must comply with the requirements of this chapter and this Ordinance.

2. POLICY ON STORMWATER POLLUTION PREVENTION

Effective stormwater pollution prevention on construction sites is dependent on a combination of preventing movement of soil from its original position (erosion control), intercepting displaced soil prior to entering a waterbody (sediment control), and proper on-site materials handling. The developer must submit to the Tippecanoe County Drainage Board, a SWPPP with detailed erosion and sediment control plans as well as a narrative describing materials handling and storage, and construction sequencing. The following principles apply to all land-disturbing activities and shall be considered in the preparation of a Stormwater Pollution Prevention Plan within Tippecanoe County.

- A. Minimize the potential for soil erosion by designing a development that fits the topography and soils of the site. Deep cuts and fills in areas with steep slopes should be avoided wherever possible, and natural contours should be followed as closely as possible.
- B. Existing natural vegetation shall be retained and protected wherever possible. Areas immediately adjacent (within 35 feet of top of bank) to watercourses and lakes also should be left undisturbed wherever possible. Unvegetated areas or vegetated areas with less than 70% cover that are scheduled or likely to be left inactive for 15 days or more must be temporarily or permanently stabilized with measures appropriate for the season to reduce erosion potential. Alternative measures to site stabilization may be acceptable if the project site owner or their representative can demonstrate they have implemented and maintained erosion and sediment control measures adequate to prevent sediment discharge from the inactive area.
- C. All activities on a site should be conducted in a logical sequence so that the smallest practical area of land will be exposed for the shortest practical period of time during development.
- D. The length and steepness of designed slopes should be minimized to reduce erosion potential. Drainage channels and swales must be designed and adequately protected so that their final gradients and resultant velocities will not cause erosion in the receiving channel or at the outlet. Methods for determining acceptable velocities are included in the Tippecanoe County Stormwater Technical Standards Manual.
- E. Sediment-laden water which otherwise would flow from the project site shall be treated by erosion and sediment control measures appropriate to minimize sedimentation. A stable construction site access shall be provided at all points of construction traffic ingress and egress to the project site.

- F. Appropriate measures shall be implemented to prevent wastes or unused building materials, including, garbage, debris, packaging material, fuels and petroleum products, hazardous materials or wastes, cleaning wastes, wastewater, concrete truck washout, and other substances from being carried from a project site by runoff or wind. Identification of areas where concrete truck washout is permissible must be clearly posted at appropriate areas of the site. Wastes and unused building materials shall be managed and disposed of in accordance with all applicable State statutes and regulations. Proper storage and handling of materials such as fuels or hazardous wastes, and spill prevention and cleanup measures shall be implemented to minimize the potential for pollutants to contaminate surface or ground water or degrade soil quality.
- G. Public or private roadways shall be kept cleared of accumulated sediment that is a result of runoff or tracking. Bulk clearing of accumulated sediment shall not include flushing the area with water. Cleared sediment shall be redistributed or disposed of in a manner that is in accordance with all applicable statutes and regulations.
- H. Collected runoff leaving a project site must be either discharged directly into a well-defined, stable receiving channel, or diffused and released to adjacent property with out causing an erosion or pollutant problem to the adjacent property owner.
- I. Natural features, including wetlands, shall be protected from pollutants associated with stormwater runoff.

3. CALCULATIONS AND DESIGN STANDARDS AND SPECIFICATIONS

In calculating the total area of land disturbance, for the purposes of determining applicability of this chapter to the project, the following guidelines shall be used:

- A. Off-site construction activities that provide services (for example, road extensions, sewer, water, and other utilities) to a land disturbing project site, must be considered as a part of the total land disturbance calculation for the project site, when the activity is under the control of the project site owner.
- B. Strip developments will be considered as one (1) project site and must comply with this chapter unless the total combined disturbance on all individual lots is less than one (1) acre and is not part of a larger common plan of development or sale.
- C. To determine if multi-lot project sites are regulated by this rule, the area of land disturbance shall be calculated by adding the total area of land disturbance for improvements, such as, roads, utilities, or common areas, and the expected total disturbance on each individual lot, as determined by the following:
 - i. For a single-family residential project site where the lots are one-half (0.5) acre or more, one-half (0.5) acre of land disturbance must be used as the expected lot disturbance.
 - ii. For a single-family residential project site where the lots are less than one half (0.5) acre in size, the total lot must be calculated as being disturbed.
 - iii. To calculate lot disturbance on all other types of projects sites, such as industrial and commercial projects project sites, a minimum of one (1) acre of land

disturbance must be used as the expected lot disturbance, unless the lots are less than one (1) acre in size, in which case the total lot must be calculated as being disturbed.

The calculation methods as well as the type, sizing, and placement of all stormwater pollution prevention measures for construction sites shall meet the design criteria, standards, and specifications outlined in the *Indiana Stormwater Quality Manual* or the Technical Standards. The methods and procedures included in these two references are in keeping with the above stated policy and meet the requirements of IDEM's Rule 5.

4. INSPECTION, MAINTENANCE, RECORD KEEPING, AND REPORTING

Following approval of the stormwater management permit by the Tippecanoe County Drainage Board and commencement of construction activities, the Tippecanoe County Drainage Board has the authority to conduct inspections of the site to insure full compliance with the provisions of this chapter, the *Indiana Stormwater Quality Manual*, and the terms and conditions of the approved permit.

A self-monitoring program must be implemented by the project site owner to insure the stormwater pollution prevention plan is working effectively. An inspector, approved by the Tippecanoe County Drainage Board, shall perform a written evaluation of the project site by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Weekly inspections shall continue until the entire site has been stabilized and a Notice of Termination has been issued. The inspector shall look at the maintenance of existing stormwater pollution prevention measures, including erosion and sediment control measures, drainage structures, and construction materials storage/containment facilities, to ensure they are functioning properly. The inspector shall also identify additional measures, beyond those originally identified in the stormwater pollution prevention plan, necessary to remain in compliance with all applicable statutes and regulations.

The resulting evaluation reports must include the name of the individual performing the evaluation, the date of the evaluation, problems identified at the project site, and details of maintenance, additional measures, and corrective actions recommended and completed. A form for documenting these inspections can be found in Appendix B of the Technical Standard.

The stormwater pollution prevention plan shall serve as a guideline for stormwater quality, but should not be interpreted to be the only basis for implementation of stormwater quality measures for a project site. The project site owner is responsible for implementing, in accordance with this chapter, all measures necessary to adequately prevent polluted stormwater runoff. Recommendations by the inspector for modified stormwater quality measures should be implemented.

Although self-monitoring reports do not need to be submitted to the Tippecanoe County Drainage Board, the Tippecanoe County Drainage Board has the right to request complete records of maintenance and monitoring activities involving stormwater pollution prevention measures. All evaluation reports for the project site must be made available to the Tippecanoe County Drainage Board, in an organized fashion, within forty-eight (48) hours of a request.

HELPFUL WEBSITES

- **Indiana Department of Environmental Management (IDEM)** <http://www.in.gov/idem/>
IDEM Storm water Quality Manual (all parts)
<http://www.in.gov/idem/stormwater/2363.htm>

Storm Water Quality Measures: Construction & Land-Disturbing Activities
<http://www.in.gov/idem/files/chap7.pdf>

Notice of Intent (NOI) AND Notice of Termination (NOT)
http://www.in.gov/idem/5157.htm#owq_stormwater
- **US Environmental Protection Agency (EPA)** <http://www.epa.gov/>
Construction Stormwater Program
<http://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>

Concrete Wash Out
<http://www3.epa.gov/npdes/pubs/concretewashout.pdf>

Developing your Storm Water Pollution Prevention Plan (SWPPP)
http://www3.epa.gov/npdes/pubs/industrial_swppp_guide.pdf
- **Indiana Department of Transportation (INDOT)** <http://www.in.gov/indot/2892.htm>
INDOT Stormwater Management Field Guide
http://www.in.gov/indot/files/StormWater_FieldGuide_2015.pdf
- **International Erosion Control Association (IECA)**
Professional Association; good source for training & resources
<http://www.ieca.org/regiononehomepage.asp>
- **Builders Association of Greater Lafayette (BAGL)**
Professional Association; good source for training & resources
<http://www.bagl.info/>
- **Southern Indiana Stormwater Advisory Committee (SWAC)**
Local MS4 Partnership; good source for training & resources
<http://www.siswac.org/>
- **Tippecanoe County Partnership for Water Quality (TCPWQ)**
Local MS4 Partnership; good source for training & resources
<http://www.tcpwq.org/>

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FACT SHEETS & BROCHURES

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STORMWATER FACT SHEET: CONSTRUCTION SITE STORMWATER BMP INSTALLATION TIPS



Quick facts on... The Installation of Erosion & Sediment Control BMPs on Construction Sites

PURPOSE: Provide a quick reference guide for the installation of several commonly used construction site erosion and sediment control BMPs.

HOW TO USE THIS GUIDE: For a particular BMP, review the photo and read the accompanying caption for key points on the proper installation of the BMP. Refer to your SWPPP for actual installation guidelines.



Temporary Seeding



327 IAC 15-5-7(b)(16): Unvegetated areas that are scheduled or likely to be left inactive for fifteen (15) days or more must be temporarily or permanently stabilized with measures appropriate for the season to minimize erosion potential.

Source: Indiana Storm Water Quality Manual

Use the seed mix specified in the SWPPP. Roughen slopes; loosen soil to a depth of 2" to 3" prior to seeding. Do not cover seed with more than 1/2" of soil.

Permanent Seeding



Source: Indiana Storm Water Quality Manual

Loosen/till topsoil to a minimum depth of 3". Add fertilizer per SWPPP. Apply seed. Apply mulch or erosion control blanket to protect permanent seeding.

Mulching



Source: INDOT Storm Water Management Field Guide

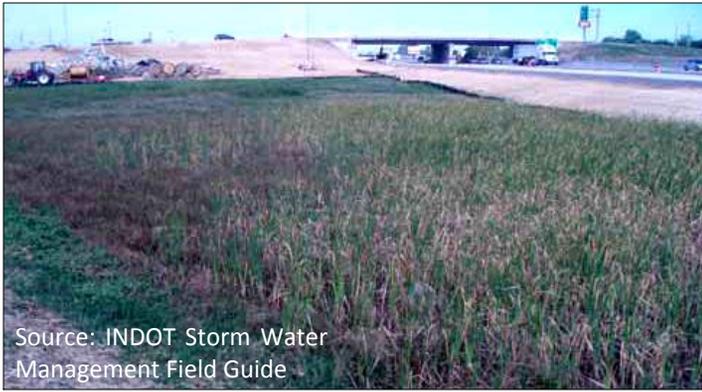
Install mulch within 24 hours of seeding. After spreading, no more than 25% of ground should be visible. Anchor/secure mulch immediately after application.

Erosion Control Blanket



Use the type of Erosion Control Blanket specified in the SWPPP. Prepare the area by removing rocks or clods over 1-1/2" in diameter. Anchor blankets in place.

Vegetative Buffer



Source: INDOT Storm Water Management Field Guide

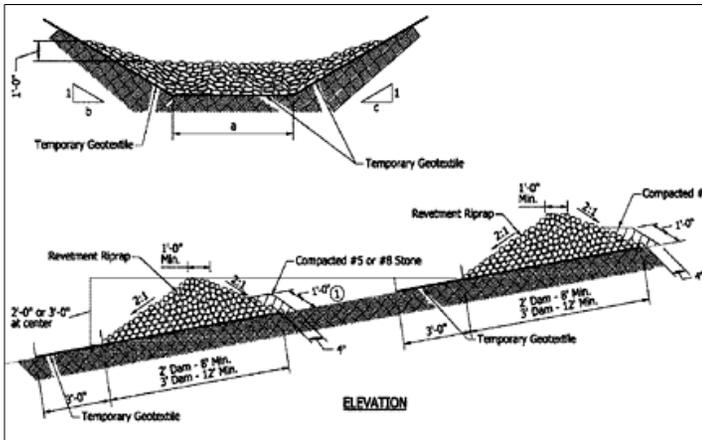
Buffer vegetation must be at least 4" tall and cover 80% or more of the surface. Weeds are not acceptable as a buffer. Never use wetlands as a vegetative buffer.

Dewatering



Water from dewatering operations must be filtered before release/discharge offsite. When using a dewatering filter bag, place bag on flat stable surface.

Rock Check Dam



Source: Indiana Storm Water Quality Manual

Install geotextile fabric (8 ounce or heavier; nonwoven). Place revetment riprap. Install #5 or #8 filter stone on front face. Tie sides into adjacent slope.

Concrete Washout

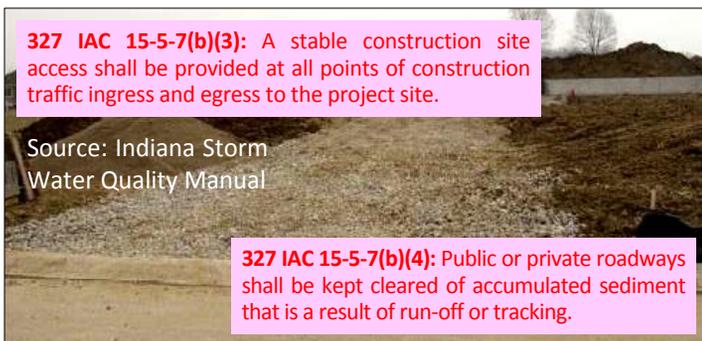


327 IAC 15-5-7(b)(16): Identification of areas where concrete truck washout is permissible must be clearly posted at appropriate areas of the site.

Source: INDOT Storm Water Management Field Guide

Locate concrete washout per SWPPP. Place bales. Use one continuous liner: DO NOT OVERLAP multiple sheets. Secure with stakes or stone. Install "Concrete Washout" sign.

Construction Entrance



327 IAC 15-5-7(b)(3): A stable construction site access shall be provided at all points of construction traffic ingress and egress to the project site.

Source: Indiana Storm Water Quality Manual

327 IAC 15-5-7(b)(4): Public or private roadways shall be kept cleared of accumulated sediment that is a result of run-off or tracking.

Avoid locating entrance on steep slopes or at curves in road. Entrance should be a minimum of 12' wide/50' long. Place #2 stone on geotextile fabric; top-dress with #53 stone.

Silt Fence



Source: INDOT Storm Water Management Field Guide

Silt fence should not be used in concentrated flow areas. Install silt fence prior to land disturbance activities. Trench in bottom of silt fence. Backfill trench.

Filter Sock



Place filter sock barrier at least 10 feet past the toe of the slope and place filter sock to be parallel to the slope contour. Overlap ends of filter sock.

Filter Berm



Filter berms can be made of rock, compost or filter sock. When using rock, place riprap on geotextile fabric with filter stone (#5 or #8) on the upslope side.

Sediment Trap



Install at location as identified by the SWPPP. Place geotextile fabric and revetment riprap. Line inside face with 12" layer of #5 or #8 stone. Stabilize outlet.

Sediment Basin



Install per SWPPP specifications. Clear/grub/prepare sub-base. Install Principal Spillway. Install embankment for pool area. Install emergency spillway.

Inlet Protection



There are multiple options for inlet protection: geotextile box with cross bracing; gravel ring (riprap with 12" of filter stone); commercial inlet filter products.

Culvert Inlet Protection



Install culvert inlet protection as identified by the SWPPP. Place revetment riprap to create the basin at the culvert. Place #5 or #8 stone as a filter around the perimeter.

For detailed information on the installation of a particular BMP on a construction site, refer to the specifications contained with the approved SWPPP for your particular construction site. For technical reference information on construction site BMPs in general, refer to the following documents which were used in the preparation of this Fact Sheet:

- INDOT Storm Water Management Field Guide – 2015 (www.in.gov/indot)
- Indiana Storm Water Quality Manual (www.in.gov/idem/stormwater/2363.htm)

This Fact Sheet provided by the Tippecanoe County Partnership for Water Quality and was prepared by Christopher B. Burke Engineering, LLC



STORMWATER FACT SHEET: CONSTRUCTION SITE STORMWATER BMP MAINTENANCE TIPS



Quick facts on... The Maintenance of Erosion & Sediment Control BMPs on Construction Sites

PURPOSE: Provide a quick reference guide for the maintenance of several commonly used construction site erosion and sediment control BMPs.

HOW TO USE THIS GUIDE: For a particular BMP, review the photo and read the accompanying caption for key points on the proper maintenance of the BMP. Refer to your SWPPP for actual maintenance guidelines.



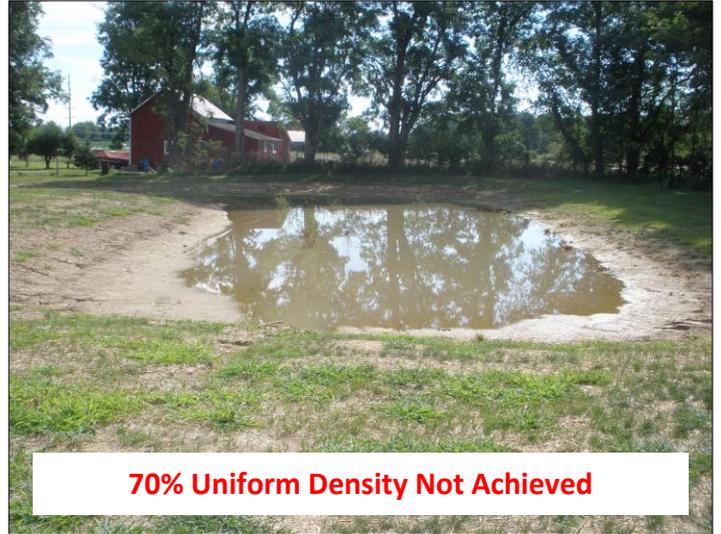
Temporary Seeding



Weeds do not Count as Temporary Stabilization

Inspect weekly & within 24 hours after a rain event of ½" or greater. Repair, re-seed and mulch eroded areas, rills and gullies. Control weeds with mowing.

Permanent Seeding



70% Uniform Density Not Achieved

Inspect weekly & within 24 hours after a rain event of ½" or greater. Repair damaged/eroded areas. If vegetation fails to grow, perform soil test and amend soil based on results.

Mulching



Mulch Not Applied Uniformly

Repair, re-seed and mulch eroded areas, rills and gullies. For severe/recurring erosion, implement additional BMP measure such as erosion control blanket.

Erosion Control Blanket

Source: INDOT Storm Water Management Field Guide



Blanket Not Installed Parallel with Water Flow

Check for displacement of the blanket and signs of erosion under the blanket. For eroded areas: pull back the blanket; add/tamp soil; re-seed; re-staple blanket.

Vegetative Buffer



Mow vegetative buffer as needed, but not shorter than 4". If trapped sediment is observed/present, remove the accumulated sediment and regrade/reseed the disturbed area. Repair any small rills that may form. If width of vegetative buffer is insufficient, increase width of buffer.

Dewatering



During inspections, check for erosion downstream of the dewatering bag. Check for tears in the dewatering bag; water and sediment capacity.

Rock Check Dam



To ensure proper flow/operational parameters, accumulated sediment shall be removed when the sediment reaches $\frac{1}{2}$ the height of the dam.

Concrete Washout



Remove hardened concrete wastes and dispose of the material. Clean the washout when 50% of capacity is reached. The liner should be replaced after each cleaning.

Construction Entrance



Sweep/scrape/remove sediment, soil or mud that has been tracked or washed onto adjacent public roadways. Redress the entrance with #2 stone to provide voids for sediment capture.

Silt Fence



Replace torn, damaged or decomposing silt fence. Remove accumulated sediment that bulges the silt fence or when sediment reaches $\frac{1}{2}$ the height of the fence.

Filter Sock



When accumulated sediment reaches $\frac{1}{4}$ the height of the filter sock, remove the sediment. Repair/replace damaged filter sock. If ponding is excessive, consider alternative BMPs.

Filter Berm



Repair eroded or damaged areas. When accumulated sediment reaches $\frac{1}{4}$ the height of the berm, remove the sediment. If ponding excessive, consider alternative BMPs.

Sediment Trap



Repair any embankment erosion. If pool area holds water for more than 72 hours, remove/replace filter stone. Remove sediment once sediment trap is $\frac{1}{2}$ full of sediment.

Sediment Basin



Repair any damage to Principal & Emergency Spillways. If pool area holds water for more than 72 hours, remove/replace filter stone. Remove sediment once design volume is reached (per SWPPP).

Inlet Protection



Flushing with water to clean inlet protection is not allowed. After each storm event, remove sediment. If inlet protection measure is repeatedly clogging, consider additional BMPs upstream.

Culvert Inlet Protection



After each storm event, remove sediment. If filter stone is clogged/choked, replace the filter stone. If inlet protection measure is repeatedly clogging, consider additional BMPs upstream.

For detailed information on the maintenance of a particular BMP on a construction site, refer to the specifications contained with the approved SWPPP for your particular construction site. For technical reference information on construction site BMPs in general, refer to the following documents which were used in the preparation of this Fact Sheet:

- INDOT Storm Water Management Field Guide – 2015 (www.in.gov/indot)
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This Fact Sheet provided by the Tippecanoe County Partnership for Water Quality and was prepared by Christopher B. Burke Engineering, LLC



Minimum Measure

Construction Site Stormwater Runoff Control

Subcategory

Good Housekeeping/Materials Management

Description of Concrete Washout at Construction Sites

Concrete and its ingredients

Concrete is a mixture of cement, water, and aggregate material. Portland cement is made by heating a mixture of limestone and clay containing oxides of calcium, aluminum, silicon and other metals in a kiln and then pulverizing the resulting clinker. The fine aggregate particles are usually sand. Coarse aggregate is generally gravel or crushed stone. When cement is mixed with water, a chemical reaction called hydration occurs, which produces glue that binds the aggregates together to make concrete.

Concrete washout

After concrete is poured at a construction site, the chutes of ready mixed concrete trucks and hoppers of concrete pump trucks must be washed out to remove the remaining concrete before it hardens. Equipment such as wheelbarrows and hand tools also need to be washed down. At the end of each work day, the drums of concrete trucks must be washed out. This is customarily done at the ready mixed batch plants, which are usually off-site facilities, however large or rural construction projects may have on-site batch plants. Cementitious (having the properties of cement) washwater and solids also come from using such construction materials as mortar, plaster, stucco, and grout.

Environmental and Human Health Impacts

Concrete washout water (or washwater) is a slurry containing toxic metals. It's also caustic and corrosive, having a pH near 12. In comparison, Drano liquid drain cleaner has a pH of 13.5. Caustic washwater can harm fish gills and eyes and interfere with reproduction. The safe pH ranges for aquatic life habitats are 6.5 – 9 for freshwater and 6.5 – 8.5 for saltwater.

Construction workers should handle wet concrete and washout water with care because it may cause skin irritation and eye damage. If the washwater is dumped on the ground (Fig. 1), it can run off the construction site to adjoining roads and enter roadside storm drains, which discharge to surface waters such as rivers, lakes, or estuaries. The red arrow in Figure 2 points to a ready mixed truck chute that's being washed out into a roll-off bin, which isn't watertight. Leaking washwater, shown in the foreground, will likely follow similar



Figure 1. Chute washwater being dumped on the ground



Figure 2. Chute washwater leaking from a roll-off bin being used as a washout container

paths to nearby surface waters. Rainfall may cause concrete washout containers that are uncovered to overflow and also transport the washwater to surface waters. Rainwater polluted with concrete washwater can percolate down through the soil and alter the soil chemistry, inhibit plant growth, and contaminate the groundwater. Its high pH can increase the toxicity of other substances in the surface waters and soils. Figures 1 and 2 illustrate the need for better washout management practices.

Best Management Practice Objectives

The best management practice objectives for concrete washout are to (a) collect and retain all the concrete washout water and solids in leak proof containers, so that this caustic material does not reach the soil surface and then migrate to surface waters or into the ground water, and (b) recycle 100 percent of the collected concrete washout water and solids. Another

objective is to support the diversion of recyclable materials from landfills. Table 1 shows how concrete washout materials can be recycled and reused.

Table 1 – Recycling concrete washout materials

Uses of Recycled Materials	Concrete Washout Materials					
	Washwater	Cement fines ^a	Fine aggregate	Coarse aggregate	Hardened concrete	Unused wet concrete
Reused to washout additional mixer truck chutes or drums	X					
Reused as a ready mixed concrete ingredient	X	X ^b	X	X		
Reused as an ingredient of precast concrete products, e.g., highway barriers, retaining wall blocks, riprap	X	X	X	X		X
Reused as crushed concrete products, e.g., road base or fill		X	X	X	X	
Reused to pave the yards of ready mixed concrete plants						X
Returned back to a surface water, e.g., river, lake, or estuary	X ^c					

a. Fine particles of cementitious material (e.g., Portland cement, slag cement, fly ash, silica fume)

b. Recyclable, if allowed by the concrete quality specifications

c. Treated to reduce the pH and remove metals, so it can be delivered to a municipal wastewater treatment plant, where it is treated further and then returned to a natural surface water

Washwater recycling, treatment, disposal

Washwater from concrete truck chutes, hand mixers, or other equipment can be passed through a system of weirs or filters to remove solids and then be reused to wash down more chutes and equipment at the construction site or as an ingredient for making additional concrete. A three chamber washout filter is shown in Figure 3. The first stage collects the coarse aggregate. The middle stage filters out the small grit and sand. The third stage has an array of tablets that filter out fines and reduces the pH. The filtered washwater is then discharged through a filter sock. An alternative is to pump the washout water out of the washout container (Fig 4) and treat the washwater off site to remove metals and reduce its pH, so it can be delivered to a publicly owned treatment works (POTW), also known as a municipal wastewater treatment plant, which provides additional treatment allowing the washwater to be discharged to a surface water. The POTW should be



Figure 3. Concrete washout filter

contacted to inquire about any pretreatment requirements, i.e., the National Pretreatment Standards for Prohibited Dischargers (40CFR 403.5) before discharging the washwater to the POTW. The washwater can also be retained in the washout container and allowed to evaporate, leaving only the hardened cementitious solids to be recycled.

Solids recycling

The coarse aggregate materials that are washed off concrete truck chutes into a washout container can be either separated by a screen and placed in aggregate bins to be reused at the construction site or returned to the ready mixed plant and washed into a reclaimer (Fig. 5). When washed out into a reclaimer, the fine and coarse aggregates are separated out and placed in different piles or bins to be reused in making fresh concrete. Reclaimers with settling tanks separate cement fines from the washwater, and these fines can also be used in new concrete unless prohibited by the user's concrete quality specifications.



Figure 4. Vacuuming washwater out of a washout container for treatment and reuse



Figure 5. Ready mixed truck washing out into a reclaimer

Hardened concrete recycling

When the washwater in a construction site concrete washout container has been removed or allowed to evaporate, the hardened concrete that remains can be crushed (Fig. 6) and reused as a construction material. It makes an excellent aggregate for road base and can be used as fill at the



Figure 6. Crushed concrete stockpile and crusher

construction site or delivered to a recycler. Concrete recyclers can be found at municipal solid waste disposal facilities, private recycling plants, or large construction sites.

Wet concrete recycling

Builders often order a little more ready mixed concrete than they actually need, so it is common for concrete trucks to have wet concrete remaining in their drum after a delivery. This unused concrete can be returned to the ready mixed plant and either (1) used to pour precast concrete products (e.g., highway barriers, retaining wall blocks, riprap), (2) used to pave the ready mixed plant's yard, (3) washed into a reclaimer, or (4) dumped on an impervious surface and allowed to harden, so it can be crushed and recycled as aggregate. Unused wet concrete should not be dumped on bare ground to harden at construction sites because this can contribute to ground water and surface water contamination.

Washout Containers

Different types of washout containers are available for collecting, retaining, and recycling the washwater and solids from washing down mixed truck chutes and pump truck hoppers at construction sites.

Chute washout box

A chute washout box is mounted on the back of the ready mixed truck. If the truck has three chutes, the following procedure is used to perform the washout from the top down: (1) after the pour is completed, the driver attaches the extension chute to the washout box, (2) the driver then rotates the main chute over the extension chute (Fig. 7) and washes down the hopper first then the main chute, (3) finally the driver washes down the flop down chute and last the extension chute hanging on the box. All washwater and solids are captured in the box.



Figure 7. Chute washout box

After the wash down, washwater and solids are returned to the ready mixed plant for recycling. A filter basket near the top of the washout box separates out the coarse aggregates so they can be placed in a bin for reuse either at the construction site or back at the cement plant.

Chute washout bucket and pump

After delivering ready mixed concrete and scraping the last of the customer's concrete down the chute, the driver hangs a washout bucket shown in Figure 8 (see red arrow) on the end of the truck's chute and secures the hose to insure no leaks. The

driver then washes down the chute into the bucket to remove any cementitious material before it hardens. After washing out the chute, the driver pumps (yellow arrow points to the pump) the washwater, sand, and other fine solids from the bucket up into the truck's drum to be returned to the ready mixed plant, where it can be washed into a reclaimer. A removable screen at the bottom of the washout bucket prevents course aggregate from entering the pump. This course aggregate can also be returned to the plant and added to the coarse aggregate pile to be reused. All the materials are recycled.



Figure 8. Chute washout bucket and pump

Hay bale and plastic washout pit

A washout pit made with hay bales and a plastic lining is shown in Figure 9. Such pits can be dug into the ground or built above grade. The plastic lining should be free of tears or holes that would allow the washwater to escape (Fig. 10). After the pit is used to wash down the chutes of multiple ready mixed trucks and the washwater has evaporated or has been vacuumed off, the remaining hardened solids can be broken up and removed from the pit. This process may damage the hay bales and plastic lining. If damage occurs, the pit will need to be repaired and relined with new plastic. When the hardened solids are removed, they may be bound up with the plastic lining and have to be sent to a landfill, rather than recycled. Recyclers usually accept only unmixed material. If the pit is going to be emptied and repaired more than a few times, the hay bales and plastic will be generating additional solid waste. Ready mixed concrete



Figure 9. Hay bale and plastic washout pit



Figure 10. Leaking washout pit that has not been well maintained

Stormwater Best Management Practice: Concrete Washout

trucks can use hay bale washout pits, but concrete pump trucks have a low hanging hopper in the back that may prevent their being washed out into bale-lined pits.

Vinyl washout container



Figure 11. Vinyl washout pit with filter bag

The vinyl washout container (Fig. 11) is portable, reusable, and easier to install than a hay bale washout pit. The biodegradable filter bag (Fig. 12) assists in

extracting the concrete solids and prolongs the life of the vinyl container. When the bag is lifted, the water is filtered out and the remaining concrete solids and the bag can be disposed of together in a landfill, or the hardened concrete can be delivered to a recycler. After the solids have been removed several times and the container is full of washwater, the washwater can be allowed to evaporate, so the container can be reused. The washwater can be removed more quickly by placing another filter bag in the container and spreading water gelling granules evenly across the water. In about five minutes, the water in the filter bag will turn into a gel that can be removed with the bag. Then the gel and filter bag can be disposed to together.



Figure 12. Extracting the concrete solids or gelled washwater

Metal washout container

The metal roll-off bin (Fig. 13) is designed to securely contain concrete washwater and solids and is portable and reusable. It also has a ramp that allows concrete pump trucks to wash out their hoppers (Fig. 14). Roll-off providers offer recycling services, such as, picking up the roll-off bins after the washwater has evaporated and the solids have hardened, replacing them with empty washout bins, and delivering the hardened concrete to a recycler (Fig. 15), rather than a landfill. Some providers will vacuum off the washwater, treat it to remove metals and reduce the pH, deliver it to a wastewater treatment plant for additional treatment and



Figure 13. Mixer truck being washed out into a roll-off bin

subsequent discharge to a surface water. Everything is recycled or treated sufficiently to be returned to a natural surface water.



Figure 14. Pump truck using the ramp to wash out into a roll-off bin



Figure 15. Delivering hardened Concrete to a recycler

Another metal, portable, washout container, which has a rain cover to prevent overflowing, is shown in Figure 16. It is accompanied by an onsite washwater treatment unit, which reduces the pH and uses a forced weir tank system to remove the coarse aggregate, fine aggregate, and cement fines. The washwater can then be reused at the construction site to wash out other mixer truck chutes and equipment. The solids are allowed to harden together and can be taken to a concrete recycler (Fig. 17) to be crushed and used as road base or aggregate for making precast products, such as retaining wall blocks. All materials are recycled.



Figure 16. Washout container with a rain cover and onsite washwater treatment



Figure 17. Delivering hardened concrete to a recycler

Siting Washout Facilities

Concrete washout facilities, such as washout pits and vinyl or metal washout containers, should be placed in locations that provide convenient access to concrete trucks, preferably near the area where concrete is being poured. However they

should not be placed within 50 feet of storm drains, open ditches, or waterbodies. Appropriate gravel or rock should cover approaches to concrete washout facilities when they are located on undeveloped property. On large sites with extensive concrete work, washouts should be placed at multiple locations for ease of use by ready mixed truck drivers. If the washout facility is not within view from the pour location, signage will be needed to direct the truck drivers.

Operating and Inspecting Washout Facilities

Concrete washout facilities should be inspected daily and after heavy rains to check for leaks, identify any plastic linings and sidewalls have been damaged by construction activities, and determine whether they have been filled to over 75 percent capacity. When the washout container is filled to over 75 percent of its capacity, the washwater should be vacuumed off or allowed to evaporate to avoid overflows. Then when the remaining cementitious solids have hardened, they should be removed and recycled. Damages to the container should be repaired promptly. Before heavy rains, the washout container's liquid level should be lowered or the container should be covered to avoid an overflow during the rain storm.

Educating Concrete Subcontractors

The construction site superintendent should make ready mixed truck drivers aware of washout facility locations and be watchful for improper dumping of cementitious material. In addition, concrete washout requirements should be included in contracts with concrete delivery companies.

Reference

NRMCA 2009. Environmental Management in the Ready Mixed Concrete Industry, 2PEMRM, 1st edition. By Gary M. Mullins. Silver Springs, MD: National Ready Mixed Concrete Association.

Websites and Videos

Construction Materials Recycling Association
www.concreterecycling.org

National Ready Mixed Concrete Association
www.nrmca.org

National Ready Mixed Concrete Research and Education Foundation
www.rmc-foundation.org

Additional information and videos on concrete washout containers and systems can be found by a web search for "concrete washout."

Photograph Credits

Figures 1, 2. *Mark Jenkins, Concrete Washout Systems, Inc.*

Figure 3. *Mark Shaw, Ultra Tech International, Inc.*

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Figures 11, 12. *Tom Card, RTC Supply*

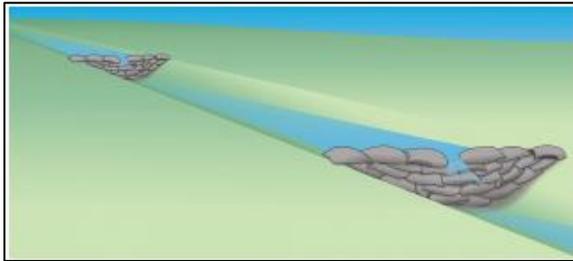
Figures 13, 14, 15. *Mark Jenkins, Concrete Washout Systems, Inc.*

Figures 16, 17. *Rick Abney Sr., Waste Crete Systems, LLP*

Disclaimer

Please note that EPA has provided external links because they provide additional information that may be useful or interesting. EPA cannot attest to the accuracy of non-EPA information provided by these third-party websites and does not endorse any non-government organizations or their products or services.

INSTALLATION

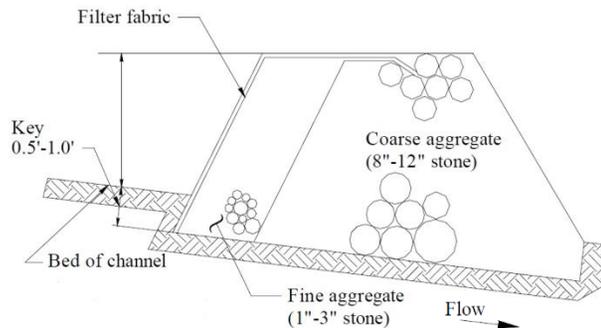


Center of rock checks should be 6-inches lower than sides to serve as an overflow.

Rock Check Spacing Along Slopes

Ditch slope	Silt check dam spacing
30%	10 ft.
20%	15 ft.
15%	20 ft.
10%	35 ft.
5%	55 ft.
3%	100 ft.
2%	150 ft.
1%	300 ft.
0.5%	600 ft.

Calculated for 3-foot high rock checks.



Typical rock check installation.

Information courtesy of:
www.tcpqw.org



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CHECK DAMS

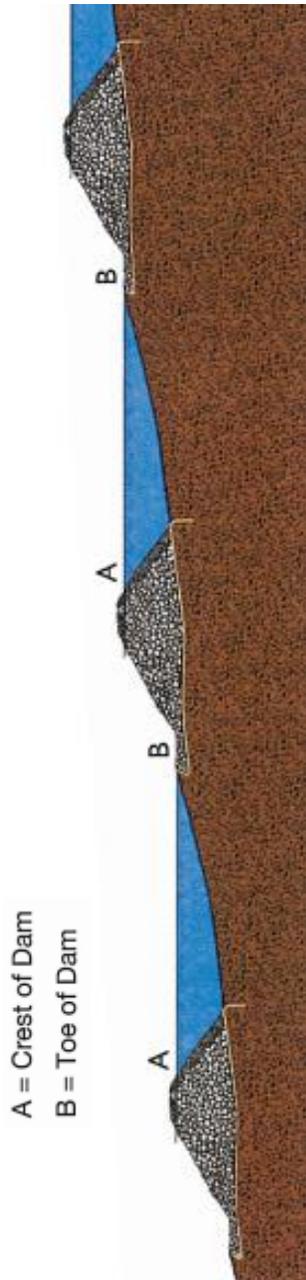


Drainage ditches need temporary silt check dams to capture sediment and reduce ditch bottom-down cutting (erosion). Check dams can be made of rock or stone-filled bags. They are only effective with smaller drainage areas, typically less than 5 acres. See table for correct check dam spacing for various channel slopes.

Overview:

- Check dams reduce erosion in a drainage channel by slowing velocity of flows.
- Seed ditches and install silt checks before excavating, filling, or grading uphill areas.
- Inspect, repair, and clean out sediment from upstream side of silt checks after each rainfall exceeding ½ inch, and when silt accumulations have reached ½ the height of the check dam.
- Do not place silt checks in creeks or streams. Sediment must be intercepted before it reaches streams, lakes, rivers, or wetlands.
- Remove temporary silt checks after the site is stabilized and vegetation is established.
- Placing filter fabric under the ditch check during installation will make removal much easier. Stone bag silt checks are easiest to remove, and can often be reused.

INSTALLATION



Downstream crest (A) shall be higher than toe (B) of upstream check dam.

EXAMPLES



Good installation of low profile temporary rock silt checks. Remember to tie the sides of silt check to upper banks. Middle section should be lower. Clean out sediment as it accumulates.



Poor installation of stone-filled bags to serve as check dam. Tied end of bag should be on the downstream end and the center should be lower than the sides.

EXAMPLES



Routine inspections and maintenance are not taking place. Sediment buildup should be cleared and missing bags replaced.



Good installation of rock silt checks maintained until the project is completely stabilized. Now that the site is stabilized, checks are ready for removal.

INSTALLATION

Regardless if above grade or below grade, systems are to be a minimum of ten feet wide by ten feet long, but sized to contain all liquid and waste that is expected to be generated between scheduled cleanout periods.



Above Grade System: The system design may utilize an earthen berm, straw bales, sandbags, or other acceptable barriers that will maintain its shape and integrity and support the polyethylene lining. Include a minimum four-inch freeboard as part of the design.



Below Grade System: Excavate soil to create a pit. Include a minimum 12-inch freeboard to reasonably ensure that the structure will not overtop during a rain event. Line the pit with ten mil (0.01 inch) polyethylene lining to control seepage. The bottom of the excavated pit should be above the seasonal high water table.

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CONCRETE WASHOUTS



Concrete washouts areas are designated locations within a construction site that are either a prefabricated unit or a designed measure that is constructed to contain concrete washout. Concrete washout systems are typically used to contain washout water when chutes and hoppers are rinsed after delivery.

Overview:

- Concrete washout systems are implemented to reduce the discharge of pollutants that are associated with concrete washout waste.
- Uncured concrete and associated liquids may leach into the soil and contaminate ground water or discharge to a waterbody, which can be harmful to aquatic life.
- Concrete washout systems are designed to promote evaporation. However, if the liquids do not evaporate and the system is near capacity it may be necessary to vacuum or remove the liquids and dispose of them in an acceptable method.

INSTALLATION

EXAMPLES

EXAMPLES

DO'S

- Ensure signage is used to identify concrete washout areas.
- Make sure all concrete suppliers and subs know where concrete washouts are located.
- Minimum of ten-mil (0.01-inch) polyethylene sheeting that is free of holes, tears, and other defects should be used inside the washout area.
- Inspect daily and after each storm event for leaks, spills, and adequate capacity.
- Once concrete wastes harden, remove and dispose of the material.
- Replace plastic liner after every cleaning because removal of material will usually damage the lining.
- The concrete washout system should be repaired or enlarged as necessary to maintain capacity for concrete washout.
- Dispose of all hardened concrete and other materials used to construct the system once the washout is no longer required. Holes, depressions, and other land disturbances associated with the system should be backfilled, graded, and stabilized.
- Make sure concrete washouts are placed away from the stormwater system and natural water bodies.

DON'TS

- Do not wash out concrete trucks or equipment into storm drains, sewer systems, wetlands, streams, rivers, creeks, ditches, or streets.
- Do not dispose of excess concrete or residual loads inside of the wash out area.



Self-contained sturdy containment systems that are delivered to a site and located at strategic locations for concrete washout.



Poor job of containing washout inside of the designed area. Washout material should be removed when capacity becomes an issue.



Good example of above grade system with straw bales and a polyethylene lining. A "Concrete Washout" sign should be installed at this location.

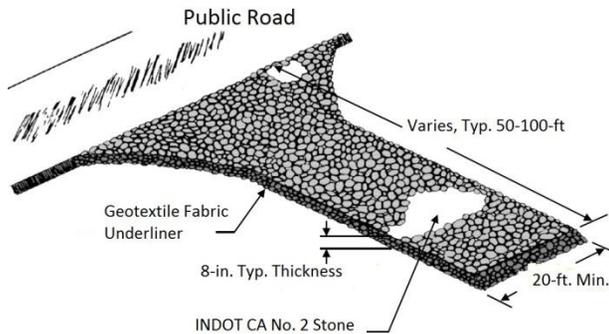


The polyethylene lining should wrap over the straw bales and be properly secured along the top. The lining used at this washout area is not thick enough.



This above grade washout system has the correct polyethylene lining which is wrapped around the straw bales. The washout is underlain with DGA to provide a solid base for the washout and to prevent punctures in the plastic liner. Straw bales are securely anchored to the ground, and a large sign identifies the washout.

INSTALLATION



Standard detail of a construction entrance. Be sure to follow the specifications required on the construction drawing. If a construction entrance is not shown, work with your local community contact to ensure an adequate construction entrance is installed.

Considerations

- Be sure to follow design criteria on the plans for entrance locations and installation procedures.
- Construction entrances should be installed at all locations where vehicles will be leaving the site and entering a roadway.
- Area drainage should be taken into account to ensure drainage flows do not flush accumulated sediment from the construction entrance. Culverts, diversion berms or other structures may be necessary to properly manage area drainage.
- Placement of construction entrances on steep slopes should be avoided whenever possible.
- Silt fence and other erosion prevention and sediment control measures should be carefully constructed near construction entrances.
- Entrances should be inspected periodically and maintenance performed as needed.
- Maintenance needs will depend on a number of factors, including the size of the site, the site conditions, the number of vehicles leaving the site, precipitation, and the duration the site is active.

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Construction Entrances

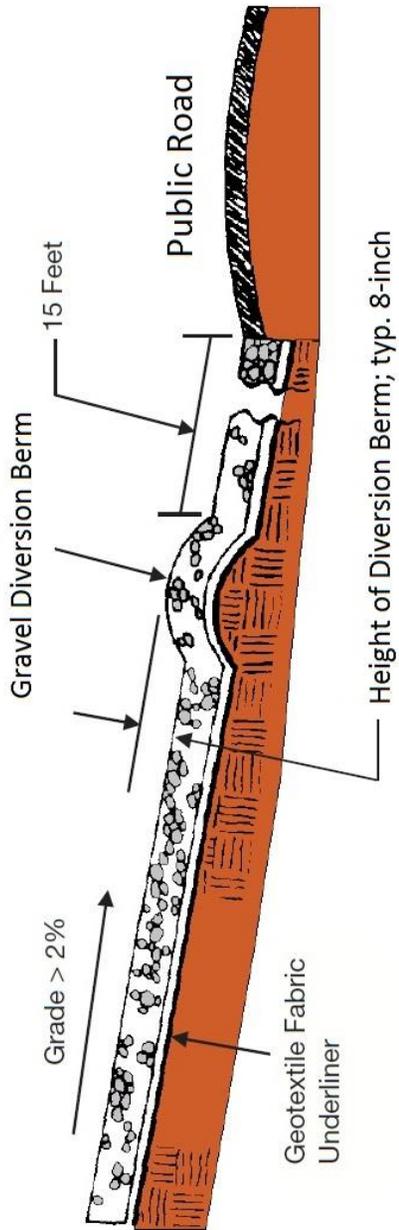


Construction entrances are access points to the site that are designed to dislodge sediment from tires before construction vehicles enter the roadway.

Overview:

- Construction entrances are access locations to and from the site that are stabilized to minimize sediment deposits on roadways.
- Entrances can range from 50 feet to over 100 feet long, depending on the size of the site, the size of the vehicles leaving the site, and the amount of traffic. NOTE: Be aware of applicable local regulations that may specify minimum design requirements.
- Rock construction entrances are typically composed of 2 - inch to 3 - inch diameter aggregate (INDOT No. 2).
- Rock construction entrances are underlain with geotextiles to minimize soil "pumping" into the coarse aggregate.
- Some construction entrances may use a wheel wash to ensure adequate cleaning of equipment before entering the roadway.

INSTALLATION



Diversion berm to be used when construction entrance is located on a downward slope to the roadway.

EXAMPLES



Example construction entrance at a small site. Notice the accumulation of sediment in the rock has resulting in transport onto the roadway. No diversion berm was installed to prevent sediment-laden runoff from flowing onto the roadway. Also note that the silt fence has not been properly turned uphill to prevent sediment washing onto the entrance and/or onto the public roadway.



Drainage is maintained through the construction entrance by installing a temporary culvert beneath the gravel entrance. The area upstream of the pipe appears to have been stabilized, but the pipe outlet needs scour protection. Also, the lack of radius on the drive will prevent medium and large vehicles from entering and leaving the site.

EXAMPLES



Example of a wet pit used for hosing of vehicles to minimize sediment deposits on the roadway. Note: The sediment collection traps must be periodically cleaned to remove accumulated sediment. Tire runoff must be diverted to an area on the site where it is detailed. These traps are only intended to collect sediment; they are not for excessively oily or greasy equipment.



Larger sites that are hauling significant amounts of material to/from the site are better managed through more significant vehicle washing measures.

Did you know... Tracking sediment from construction sites onto public roads is not permitted under local Illicit Discharge Detection and Elimination ordinances.

CONSIDERATIONS



Avoid construction in areas that do not need to be disturbed whenever possible. Preserving vegetation both limits the need for erosion prevention measures on disturbed areas, as well as helps to intercept sediment and other pollutants before leaving the site.

Minimizing the total area disturbed has multiple benefits including:

- Remaining vegetation buffers help to filter runoff and decrease sediment in stormwater runoff leaving the site;
- Reduced need for erosion prevention measures;
- Decreased needs for sediment control measures;
- Fewer disturbed areas could potentially result in simplified self-inspections, as a smaller area has been disturbed;
- Disturbing the least area possible can help with inspections from regulators and may benefit overall site compliance;
- Preserving existing vegetation will minimize costs associated with additional erosion prevention and sediment control measures;
- Smaller disturbed areas will decrease the costs to permanently stabilize the completed construction site.

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Construction Sequencing

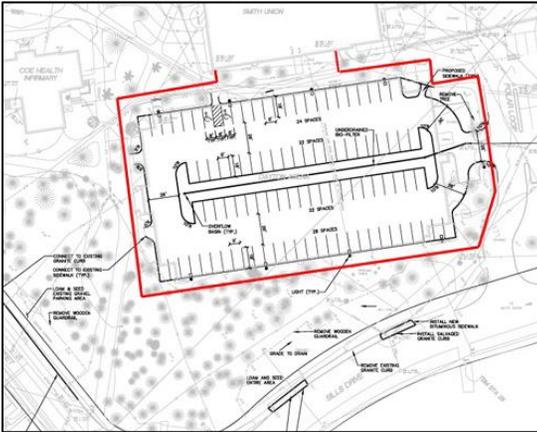


Construction sequencing coordinates the timing of all land disturbing and construction activities. It is vital that all personnel are aware of when and where construction activities are scheduled to take place to maintain permit compliance and protect water quality.

Overview:

- Construction sequencing coordinates when certain activities should take place.
- Sequencing should be clearly reflected on the construction drawings and in the narrative for the erosion prevention and sediment control plan.
- Proper sequencing limits the exposure time of disturbed areas.
- Correct construction sequencing often saves money since fewer erosion prevention and sediment controls are needed.
- Because construction may experience delays, it is not always necessary to specify exact dates for each phase. However, the construction sequence should specify when activities occur relative to each other (e.g., after perimeter controls are in place, initiate phase one of roadway construction.)

EXAMPLES



It is essential that the contractor and all working on the site fully understand the disturbance limits for each phase of the project.



Project plans should clearly specify the order of construction. To minimize delays for plan review and permit issuance, clearly explain the construction sequence on both the drawings and in the erosion prevention and sediment control plan.

PRACTICES TO OBSERVE

DO'S

- Prior to any land disturbing activities, hold a preconstruction meeting and invite all contractors, subcontractors, utility companies, project owners, self-inspection personnel, municipal representatives and inspectors, and others involved with the construction.
- Ensure the perimeter control plan is in place, including construction entrances, perimeter silt fence and barriers, checks, outfall protection, and other measures identified on the approved plans.
- Whenever possible, rely on phased construction to disturb the least amount of area possible and only those areas identified on the plans.
- Coordinate with municipal inspectors to obtain prior approval on proposed changes to the construction sequence.
- Keep plans updated, including drawings and timelines, and regularly coordinate with all parties regarding changes.
- Reflect on the plans any conditions in the field that were not originally identified (e.g., sinkholes, springs, etc.)
- Clearly designate with flags or other measures the areas that are to remain undisturbed throughout the construction process.
- Through signage, identify where critical areas of the site are, including staging areas, fueling, concrete washouts, and other critical areas, throughout the construction process.
- Stabilize disturbed areas as soon as possible and within the schedule specified in the permit.
- For areas experiencing routine problems, work with appropriate parties to make enhancements to the construction practices.

PRACTICES TO OBSERVE

DON'TS

- Do not disturb areas unless the plans clearly indicate if and when to do so.
- Do not continue to implement a plan that is not functioning properly. Coordinate with your local inspector and the design engineer to make sure appropriate enhancements are made.
- Do not assume that an erosion prevention as sediment control permit grants you the permission to clear the entire site. The plans must be followed or else the permit is being violated.



Photo courtesy of Ocean County Soil Conservation District.

When not used properly, silt fences will not protect against erosion and stormwater runoff. This silt fence was not properly secured into the ground, which allowed stormwater and silt to leave the construction site.

Tip for Maintaining Erosion Protection During Construction... Check all sediment and erosion controls and maintain them on a daily to weekly basis and after any storm event.

EXAMPLES



Waste material is not placed inside the dumpster allowing trash to blow around the site area and onto adjacent land. Trash is exposed to rain, which could wash pollutants into the drainage system.



Poor trash management. Polluted runoff from the site can contaminate streams and other bodies of water.

Improper construction waste management can result in fines and other penalties. Keep your site clean.

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CONSTRUCTION WASTE



Construction waste consists of unwanted material produced directly or incidentally by construction.

Overview:

- This includes building materials such as insulation, nails, electrical wiring, and rebar, as well as waste originating from site preparation such as dredging materials, tree stumps, and rubble.
- Construction wastes from demolitions may contain lead, asbestos, or other hazardous substances. Use caution when handling materials.
- Much building waste is made up of materials such as bricks, concrete, and wood, damaged or unused for various reasons during construction.
- Used latex paint should not be directly emptied into the dumpster. Air-dry paint before disposal.
- Dumpsters should always be covered when not in use to prevent pollutants from escaping.
- Proper signage should be used to identify the location of the dumpster.
- Dumpsters should be routinely emptied to prevent overflow of construction waste.

EXAMPLES



Large pieces of construction waste should be broken down and placed inside the designated disposal dumpster. Material piled up in the background should also be placed in the dumpster.



Unused latex paint should be opened to air-dry before disposing into dumpster. Make sure paint is opened in a confined area and that there is no possibility that it could be spilled onto the ground or into or near the drainage system. It is illegal to dump or rinse paint into the stormwater system.

EXAMPLES



Food and beverage containers are among the items considered construction waste.



The EPA estimates that only 20% of construction and demolition debris waste is being recycled. Proper recycling can free up space within a dumpster and reduce the number of dumpsters needed.

NOTE: Limbs and woody debris collected from site clearing activities may only be burned when allowed by federal, states, and local regulations. Always check with the local fire marshal prior to any burning activity. It is never acceptable to burn anything other than woody debris that is completely free of glues, chemicals, and other man-made products.

EXAMPLES



Majority of the construction waste is contained inside the dumpster. Liquids should never be emptied in the dumpster.



Dumpsters should be covered when not in use so pollutants inside the dumpster are not released during a rain event.

EXAMPLES



As soon as feasible, sites should be temporarily stabilized with straw, or permanently stabilized with grass and sod. When straw is used, it should be crimped or “punched” into the ground to prevent the straw from moving during wind and rain events. Erosion control mats or sod should be used in concentrated flow areas, such as ditches and swales.



Each site should have a construction exit. A well-maintained construction exit keeps mud off the pavement and out of storm drains. If mud or soil is tracked on the road, it should be cleaned up immediately.

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INDIVIDUAL BUILDING SITES



Individual building sites must be carefully managed in order to minimize pollutants from leaving the property. Individual building sites often have multiple contractors and subcontractors developing the property, therefore it is important to make sure all involved parties have proper training. Anyone operating on the site should be aware of construction entrances, erosion control practices, stormwater inlet protection, concrete and mortar washout management, and construction waste management from construction materials like bricks, paint, and other building materials.

Overview:

- Make sure all vehicles, including delivery trucks, enter and leave the site from a stabilized entrance.
- If sediment is tracked onto the road, it should be immediately collected from the road and deposited in a contained area, such as behind a silt fence.
- Designated concrete washout areas shall be located near the building site. It is not acceptable for concrete trucks to flush waste in storm drains or other areas not designated for concrete and mortar waste.

- Waste construction products shall be regularly cleaned from the site and properly disposed of in dumpsters in designated areas. Dumpsters shall be located away from stormwater conveyances. Dumpster shall have lids that will remain closed when not in use.
- Silt fences installed on individual building sites shall fully contain and pond sheetflow from the site. Runoff shall not be permitted to flow around the end of the silt fence.
- Ensure disturbed areas, such as graded areas and stockpiles, are stabilized as soon as feasible.
- **Ensure all contractors and subcontractors operating on the site have proper training and are aware of all appropriate stormwater pollution prevention practices.**

EXAMPLES



Silt fences should be installed and maintained in disturbed areas to collect sheet flow runoff from the site. Never place a silt fence across concentrated flow, such as a ditch, swale, or drainage channel.

EXAMPLES



Provide inlet protection at curb inlets and/or catch basins around the building site. Never dispose of or deposit any substance into the storm collection system.



Properly dispose of construction waste into a provided dumpster. Pick up garbage to prevent items leaving the site. Make sure dumpster remains closed at all times to prevent exposure to rainwater.

EXAMPLES



Unused latex paint should be opened to air dry before disposing into dumpster. Make sure paint is opened in a confined area and that there is no possibility that it could be spilled onto the ground or into or near the drainage system. It is illegal to dump or rinse paint into the stormwater system.

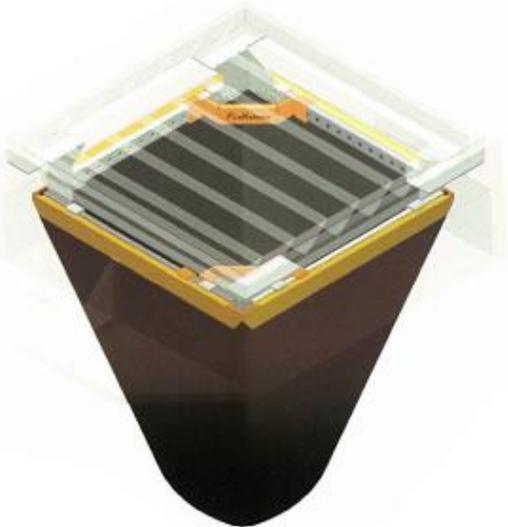


Contractors and subcontractors should utilize concrete washouts whenever pouring or placing concrete or mortar. Washouts should be used for rinsing off mortar and concrete mix, process and placement equipment. It is not acceptable to wash off equipment outside of a contained concrete washout area.

INSTALLATION



When using straw bales as inlet protection, excavate a trench at least 4-inches deep and a bale's width around the inlet. Anchor the bales by driving two 36-inch long, 2-inch by 2-inch hardwood stakes through each bale until nearly flush with the top of the bale. **Straw bales are not allowed for paved surfaces.**



This is an example of a commercial inlet protection product that will fit into the opening of a cast iron frame. The woven geotextile fabric collects sediment while letting the filtered runoff pass through. These inserts can be applied to a variety of storm drain openings.

Information courtesy of:
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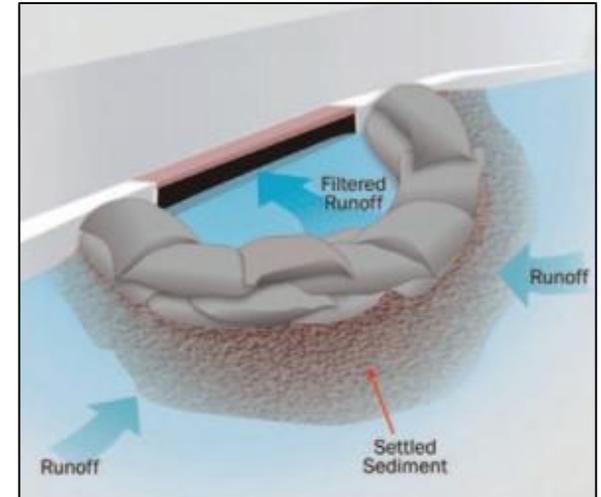
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INLET PROTECTION



Inlets can be protected with structures made of rock, reinforced silt fence, stone-filled bags, or commercial "inlet dam" products.

Overview:

- Place materials to form a barrier around the inlet.
- Build larger dams farther away from inlets with heavy incoming flows.
- Accumulated sediment must be removed after each rain to ensure effectiveness.
- When using rock bags, fill bags to approximately 50% to ensure overlapping and eliminate large openings.
- When using rock, mix rock of various sizes so flows can seep through the bags slowly.
- Deposit the removed sediment in an area that will not contribute sediment off-site and can be permanently stabilized.

INSTALLATION



Inlet protection berm construction of half-filled stone bags. Use #57 rock, overlap bags to eliminate large openings and rapid flow-through.



Stone-filled bags of either burlap or woven geotextile fabric should be used. Leave one bag gap in the top row to provide a spillway for overflow.

Properly installed inlet protection keeps sediment and trash out of local waterways, including streams, rivers, and lakes, and protects our environment.

EXAMPLES



Excellent use of rock-filled mesh tubes to control sediment at curb inlet. Concrete block spacers keep tubes from moving into - and clogging - the inlet during heavy flows.



Good application of silt fence frame to protect inlet. Use wire fence backing to reinforce frame, or diagonal bracing across top of stakes. Make sure fence is trenched in to prevent bypasses or undercutting. Inspect and remove sediment as necessary after each rain. Expect a more frequent replacement schedule for silt fence drop inlet protection.



Example of poor inlet protection and inadequate maintenance.

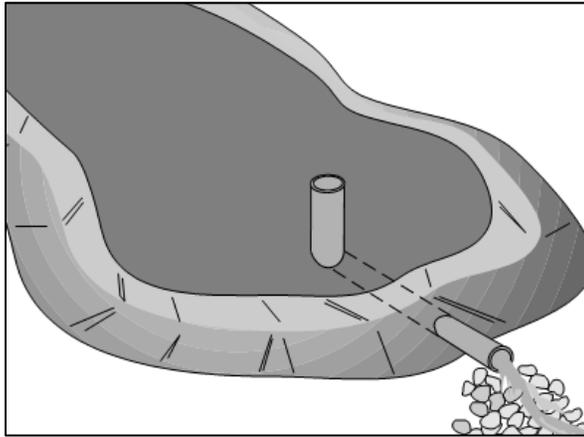


Poor placement of stone bag inlet dam. Bags work well if used properly and maintained. Bags must form a dam around the inlet with no large gaps.

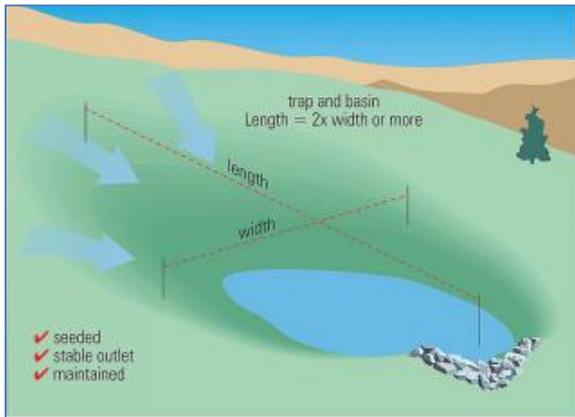


Poor placement and poor maintenance of stone bag inlet ponding dam. Accumulated sediment must be removed and dam should be repaired.

INSTALLATION



A sediment basin is a temporary basin formed by excavation or by constructing an embankment. Sediment basins typically have principal spillways (riser and barrel) do to the contributing drainage area. The spillways must be properly stabilized to prevent erosion at the basin outlet.



Sediment traps are designed to treat runoff from about 1 to 5 acres. Sediment basins are larger, and serve areas of about 5 to 10 acres. Basins draining areas larger than 10 acres require an engineered design. Sediment basins should be long and narrow to encourage the settling of suspended soil particles.

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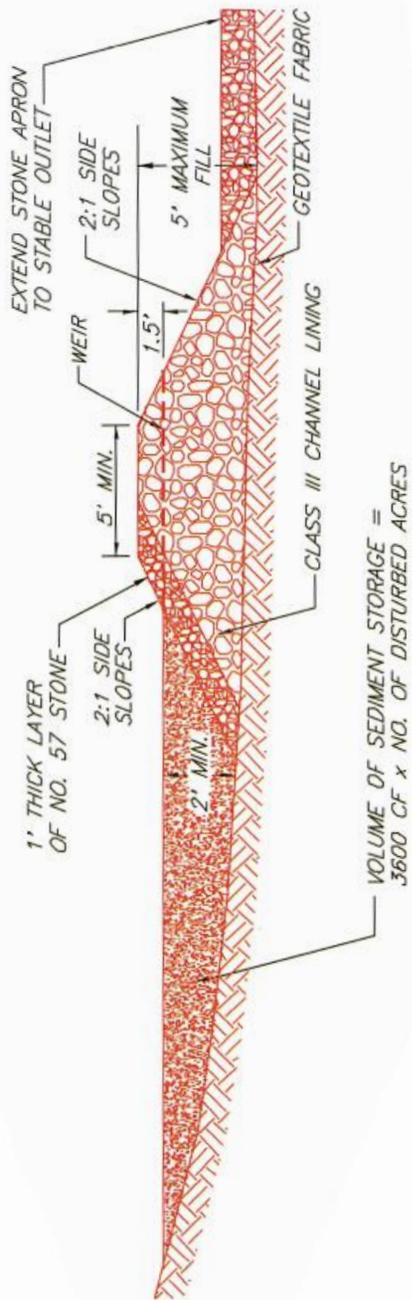
SEDIMENT TRAPS AND BASINS



Sediment traps and basins are sediment control measures that pool storm water runoff and allow sufficient retention time for settling suspended soil particles.

Overview:

- Sediment traps and basins are installed in natural drainage areas before excavation or fill work begins.
- Do not install sediment traps or basins near, along, or in a stream.
- Place traps and basins where concentrated flows are present.
- The traps and basins must be inspected weekly and after every rainfall greater than ½ inch.
- Remove sediment traps only after upstream areas have been stabilized.
- **Do not depend on sediment traps and basins alone to control sediment loss from the construction site. These traps must be used with other site management practices.**



Cross sectional view of sediment trap

EXAMPLES



Fair installation of two traps above a small pond. Dikes are a little too small and the area needs seed and mulch.



Example of poor trap installation. Overflow notch is too deep and surrounding area needs seed and mulch to prevent erosion.



Good example of a sediment trap. Rock overflow notch is properly installed and bare soil has been covered with seed and mulch.

EXAMPLES



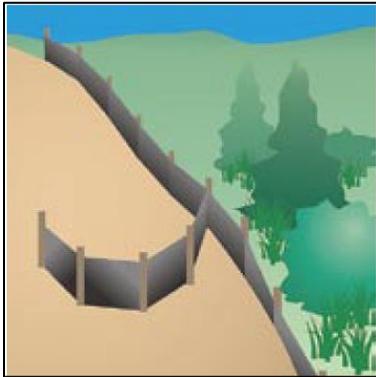
Example of poor sediment trap installation. Silt fencing should never be used as an outlet structure for a sediment trap.



Good application of sediment trap installation. The stone spillway provides a stable overflow structure. Sediment basin is at capacity and should be cleaned prior to next storm event.

Sediment traps should be used at outlets of stormwater diversion structures, channels, slope drains, construction site entrance wash racks, or other areas where sediment-laden runoff may flow.

INSTALLATION



Install “J-hooks” along extended portions of diversion silt fence to promote ponding and minimize the potential for silt fence failure.

Silt Fence Spacing Along Slopes

Land Slope	Max. Slope Distance
3% – 5%	100 ft.
5% – 10%	75 ft.
10% – 20%	50 ft.
20% – 50%	25 ft.



Use multiple sections of silt fence to interrupt long slopes.

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SILT FENCE

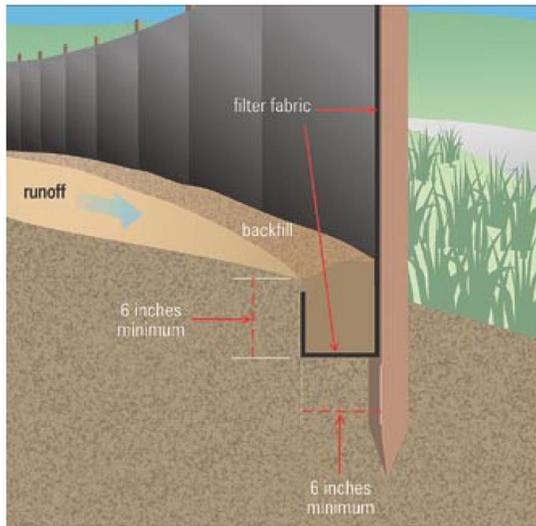


Silt fencing is commonly used to pond, settle, and filter sediment from sheet runoff. On slopes, set back from slope toe to allow for maintenance. Make sure fencing is trenched in properly and stakes are on the downhill side. Inspect frequently to detect and address bypasses, undercutting, and overtopping.

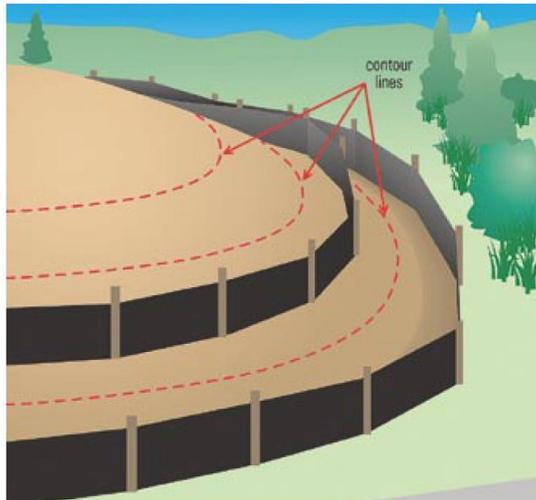
Overview:

- Place filters on the downhill end of bare soil areas.
- Make sure the fence catches all runoff for a specific area and ponded water cannot flow around the end of the fence.
- Avoid placing near vehicle traffic to avoid equipment and vehicles driving over fence.
- Install multiple sections of silt fence for long slopes and steep slopes. Place every 60 to 110 feet.
- Do not use silt fence in concentrated flow areas, like channels, swales and ditches.
- Make sure the downstream end of the silt fence is installed along the contour to increase the ponding area. (i.e. place fence along the same elevation.)
- Clean accumulated silt from behind fence once sediment has reached 1/3 the height of the fence.
- Inspect all silt fences prior to an anticipated storm event to avoid failure.
- Because a silt fence has a 6-9 month lifespan, make sure routine replacements occur.

INSTALLATION



Install silt fence prior to land disturbing activities. Silt fencing should be installed 6 inches deep, at a minimum. Make sure wooden stakes are on the downstream side of the flow.



Install silt fencing along the contours. Make sure silt fence is spaced up the slope to allow for multiple ponding areas and to interrupt excessively long, denuded areas.

EXAMPLES



This silt fence is still functioning, but in need of cleaning and replacement.



Use wire-reinforced silt fence and steel posts to reinforce sections downstream of large areas.

EXAMPLES



Two sections of silt fence not properly connected. Sections should be overlapped and wrapped together.

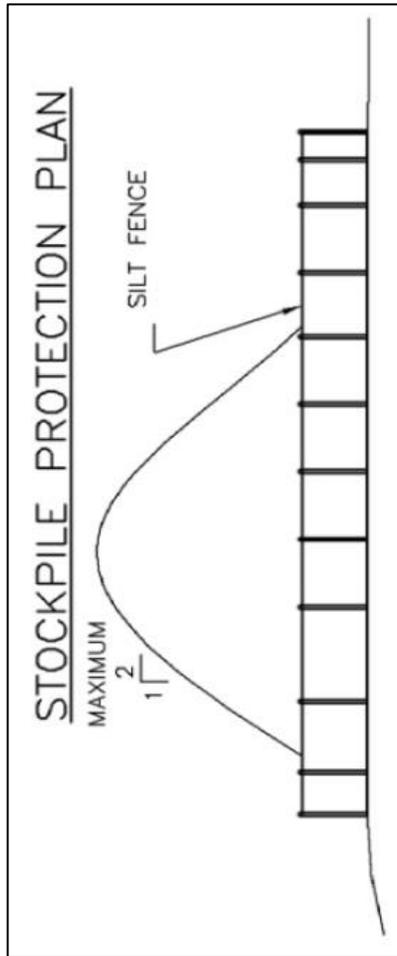


Improper trenching of silt fence.



Inadequate maintenance of silt fence.

INSTALLATION



Typical stockpile cross section, surrounded by silt fence. Stockpile slopes should not be too steep to minimize instability problems. Though 2:1 (H:V) is the maximum steepness for stockpiles, some soils may require flatter slopes. The silt fence opening and stock pile entrance should be located on the upper slope to prevent runoff from leaving the fenced area.

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STOCKPILING

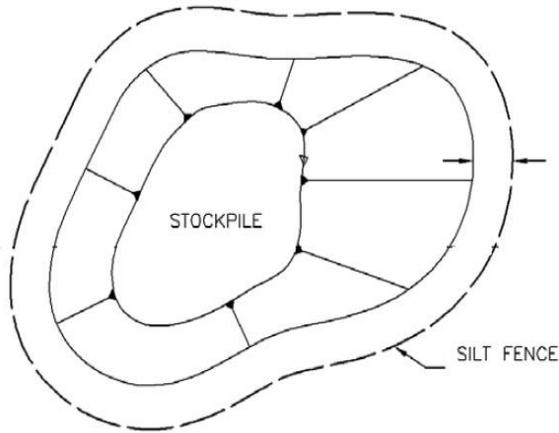


Stockpiles of soil can deliver large amounts of muddy runoff to paved roads, adjacent lawns, and local creeks. A silt fence should be placed around stockpile areas to prevent silt-laden runoff from leaving the site.

Overview:

- Stockpiles should be placed well away from drainage channels and conveyances.
- Stockpile areas should have silt fence place prior to the placement of soils.
- A buffer should exist between the edge of the pile and the surrounding silt fence.
- Soil should be stored on flat areas and surrounded with silt fencing to control offsite sediment impacts.
- Stockpiles should be temporarily seeded if anticipated to be inactive for a period of 15 days or more.
- No construction waste or debris should be placed in stockpile areas.
- Silt fence should be regularly inspected and replaced, as with all other sediment control structures.

INSTALLATION



Ensure there is a buffer between the stockpile and the silt fence. Small stockpiles (less than 20 feet in diameter) should have at least a 3-foot buffer between the edge of the pile and the silt fence. Large stock piles (greater than 20 feet in diameter) should have at least a 10-foot buffer between the edge of the pile and the silt fence. Ideally, there should be a vegetated buffer beyond the silt fence to intercept suspended particles that may flow through the silt fence barrier.

When necessary to grade large areas, it is beneficial to strip topsoil to preserve it for final site stabilization. When stockpiled topsoil is left idle, it should be temporarily seeded to minimize erosion from the pile.

Locate stockpiles away from drainage courses, storm drain inlets, or concentrated flows of stormwater to prevent sediment from entering waterways, such as streams, rivers, and lakes.

EXAMPLES



A silt fence should be added around the stockpile to provide a barrier between the road and the stockpiled soil. Whenever possible, stockpiles should be located away from drainage conveyances.



Good application of using a silt fence around the stockpile to protect a stream in the foreground from direct runoff. The stockpile should be seeded and mulched for additional protection.

EXAMPLES



Poorly maintained silt fence surrounding the large stockpile area.



A solid-fabric waterproof material can be used to cover stockpile areas.

Covering stockpiles is an effective method of soil stabilization and helps prevent sediment runoff.

INSTALLATION

Temporary Seeding:

- Test soil to determine pH nutrient levels.
- Apply soil amendments as recommended by the soil test. If testing is not done, apply 400 to 600 pounds per acre of 12-12-12 analysis fertilizer, or equivalent.
- Work the soil amendments into the upper two to four inches of the soil with a disk or rake across the slope.
- Mulch alone is an acceptable temporary cover and may be used in lieu of temporary seeding, provided that it is appropriately anchored.
- Monitor for erosion damage and adequate cover. Reseed, fertilize, and apply mulch when and where necessary.
- Make sure the sites stormwater pollution prevention plan (SWPPP) is always followed for temporary seeding procedures. If the procedures outlined in the SWPPP do not adequately stabilize the site, it will be necessary to modify the SWPPP to meet the conditions of the site.

Table 2. Temporary seeding Specifications

Seed Species	Rate per Acre	Optimum Dates ¹
Wheat or Rye	150 lbs.	Sept. 15 - Oct. 30
Spring Oats	100 lbs.	March 1 - April 15
Annual Ryegrass	40 lbs.	March 1 - May 1 Aug. 1 - Sept. 1
German Millet	40 lbs.	May 1 - June 1
Sudangrass	35 lbs.	May 1 - July 30
Buckwheat	60 lbs.	April 15 - June 1
Sorghum	35 lbs.	May 1 - July 15

¹Seeding done outside the optimum seeding dates increases the chances of seeding failure.

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TEMPORARY SEEDING AND MULCHING



Temporary seeding involves the establishment of rapid-growth annual grasses or small grains to stabilize disturbed areas until such time as a permanent, non-erosive cover can be established. Mulching is the application of plant residues like straw or wood chips to enhance and protect vegetative establishment and minimize erosion potential.

Overview:

- Temporary seeding and mulching provides vegetative cover where permanent seeding is not desirable or practical.
- Temporary seeding reduces sediment-laden stormwater runoff from being transported to downstream areas and waterways.
- Bare soil in excavated or fill areas must be seeded, mulched, or covered immediately after final grading work is completed.
- Mulching provides temporary surface stabilization.
- Mulching conserves soil moisture, moderates soil temperature, and promotes seed germination and seeding growth.

INSTALLATION

Mulching:

- Apply mulch at the recommended rate shown in Table 1.
- Spread the mulch material uniformly using hands, hayfork, mulch blower, or hydraulic mulch machine.
- Anchor straw or hay mulch immediately after application. Acceptable methods to stabilize much include:
 - Crimp with a mulch anchoring tool, a weighted farm disk with dull serrated blades set straight, or track cleats of a small bulldozer
 - Apply hydraulic mulch with short cellulose fibers
 - Apply a liquid tackifier/straw binder
 - Cover with netting secured by staples
- Mulching is not recommended in concentrated flows such as ditches, channels, swales, and at pipe discharges. Consider erosion control blankets or other more protective measures.
- Make sure the sites stormwater pollution prevention plan (SWPPP) is always followed for mulching procedures. If the procedures outlined in the SWPPP do not adequately stabilize the site, it will be necessary to modify the SWPPP to meet the conditions of the site.

Table 1. Mulch Specifications

Material	Rate per Acre	Comments
Straw or hay	2 tons	Should be dry, free of undesirable seeds. Spread by hand or machine. Must be crimped or anchored.
Wood fiber or cellulose	1 ton	Apply with a hydraulic mulch machine and use with tacking agent

EXAMPLES



Example of temporary seeding to cover open areas where construction is not taking place.



Straw applied evenly over newly seeded areas to provide temporary erosion control.



Temporary seed and mulch not applied to the slope. Erosion of soil occurs during rain event.

EXAMPLES



Straw mulch being placed by hand over bare soil.



Hydro seeding applied to bare soil to speed up slope stabilization.

Temporary seeding and mulching is a cost-effective erosion and sediment control measure. It can be used in many locations including stream banks, drainage ways, ditches, road cuts, utility right-of-ways, detention basins, and new construction sites.

