CITY OF FORT WAYNE MASTER UPDATED: 03/12/2018

SECTION

NTS: This section provides general procedures and requirements for erosion and sedimentation control during construction, including controls for stormwater runoff. The listed materials and techniques outline typical erosion control requirements for the majority of utility projects. When projects require additional erosion control methods beyond these listed herein, refer to the *Indiana Storm Water Quality Manual* for additional details and requirements. The latest version can be obtained from IDEM’s website (<http://www.in.gov/idem/stormwater/2363.htm>). Add requirements and delete inapplicable paragraphs as necessary, and edit to suit the project.

This section is also intended for projects with permanent erosion control measures, since in most cases the material and installation requirements for the temporary and permanent erosion controls are the same. Specific structures that are commonly used as both a permanent or temporary installations include rock check dams, coir logs, and erosion control blankets. If project includes both permanent and temporary ensure that any project specific requirements that may be different between a temporary and permanent erosion control are clearly defined. Coordinate with the drawings and measurement and payment.

Control of stormwater runoff, sedimentation, and erosion may necessitate special requirements for each project. Coordinate these with sections listed in Paragraph “1.1.B” of this section, and with site work specifications, as applicable.

For multiple-prime contract projects, edit this section to specify the contractor responsible for temporary erosion and sedimentation control.

1. GENERAL
	1. DESCRIPTION
		1. Scope:
			1. Contractor shall provide and maintain methods, equipment, and temporary construction as required to control conditions at the Site and adjacent areas.
			2. Contractor shall maintain all controls until Contractor warranty period is complete, or until controls are no longer needed, whichever is earlier. Upon completion of the Work, remove temporary controls and restore Site to specified condition; if condition is not specified, restore Site to pre-construction condition.

NTS: Remove paragraph “4” if project does not include permanent erosion control methods.

* + - 1. Contractor shall provide all labor, materials, equipment and services required to provide all permanent erosion control measures as required.

NTS: Insert at (--1--) below only sections covering products, construction, and equipment that a user may expect to find in this section, but are specified elsewhere. Do not list administrative and procedural Division 01 sections.

* + 1. Related Sections:
			1. Section 31 05 19, Geosynthetics for Earthwork.
			2. Section 31 32 20, Channel Protection Systems
			3. Section 32 05 19.19, Geogrids for Exterior Improvements.
			4. Section (--1--).
	1. QUALITY ASSURANCE
		1. Comply with applicable provision and recommendations of the following:
			1. Erosion Control methods and procedures shall comply with 327 IAC 15-5. Any inconsistencies with 327 IAC 15-5 will not apply except if inconsistency has been approved by IDEM or the IDNR Division of Soil Conservation.
			2. Indiana Storm Water Quality Manual, formerly the Indiana Handbook for Erosion Control in Developing Areas. Copies are available from Indiana State Department of Agriculture, Division of Soil Conservation 101 W. Ohio Street, Suite 1200, Indianapolis, IN 46204, or downloaded at http://www.in.gov/idem/4899.htm.
			3. Indiana Department of Transportation (INDOT) Standard Specifications, current edition.
	2. SUBMITTALS
		1. Erosion Control Plan:
			1. Plan for construction staging and maintenance of the Site relative to erosion and sediment controls. Indicate on a Site plan approximate areas of planned disturbance of soils and soil cover over time during the Project. For areas not indicated in the Contract Documents as being disturbed and that Contractor proposes to disturb, Erosion Control Plan shall include proposed erosion and sediment control measures for the additional area.

NTS: Delete Paragraph “2-4” when not required. Location and details of temporary sedimentation basins, concrete washout areas, and construction entrances may be indicated on the Drawings.

* + - 1. Location and details of temporary settlement basin(s).
			2. Location and details of temporary concrete washout areas.
			3. Location and details of temporary construction entrance(s).
		1. Product Data, Manufacturer Installation and Maintenance Instructions:
			1. Submit manufacturer product data, installation instructions and maintenance instructions for all erosion control products included in this specification.
		2. Erosion Control Inspection Log
			1. Contractor shall submit a copy of all erosion control inspection logs, completed in accordance with Section 3.2, with each monthly pay application.
			2. Pay application will not be approved without the submittal of the erosion control inspection log.

NTS: Section “1.4” is to be included if project is bid on unit price basis. Section to be deleted or revised if project is to be bid on lump sum basis.

* 1. MEASUREMENT AND PAYMENT

NTS: Retain one version of Section “A” below and delete the other two. Use the first version for unit price payments. Use the second version for lump sum payments of individual items. Use the third version for lump sum payment of all items together.

NTS: Insert at (--1--) and (--2--) below the various temporary and permanent erosion controls to be used for project. Add or delete work item numbers as needed.

* + 1. Erosion and Sedimentation Control: (Unit Price)
			1. Work Item Title and Number

 **01 57 13-A (--1--) Temporary Erosion and Sedimentation Control**

 **01 57 13-B (--2--) Temporary Erosion and Sedimentation Control**

* + - 1. Payment for Erosion and Sedimentation Control shall be on a unit price basis per type and unit, as indicated in the Bid Schedule.
			2. The payment quantity shall be based on the units actually installed, and removed upon completion, to complete the erosion control plan requirements .

NTS: Use the following work items if project includes permanent erosion controls that are not going to be removed at the end of the project and that are to be paid for on a unit rate basis. Edit as required and add additional description as required based on the controls being installed.

* + 1. Permanent Erosion and Sedimentation Control: (Unit Price)
			1. Work Item Title and Number

 **01 57 13-A (--1--) Erosion and Sedimentation Control**

 **01 57 13-B (--2--) Erosion and Sedimentation Control**

* + - 1. Payment for Erosion and Sedimentation Control shall be on a unit price basis per type and unit, as indicated in the Bid Schedule.
			2. The payment quantity shall be based on the units actually installed, as shown on the Drawings .

NTS: Use the following paragraph “A” if erosion control is to be bid on a lump sum basis. If project includes temporary and permanent erosion controls coordinate the work descriptions below for any additional requirements for permanent erosion controls that are not going to be removed at the end of the project.

* + 1. Erosion Control: (Lump Sum)
			1. Work Item Title and Number

 **01 57 13-A Erosion and Sedimentation Control**

* + - 1. Payment for Erosion and Sedimentation Control shall be a lump sum price.
			2. The lump sum price shall constitute full compensation for providing all labor, materials, and equipment, both temporary and permanent, and all other cost associated with the installation and maintenance of all control devices, with the removal of sediment deposits and temporary erosion control devices as required, cleaning of paved surfaces and all other cost associated with erosion and sediment protection.

NTS: Use the following paragraph “A” if erosion controls are not going to have separate work items.

* + 1. This item is to be included in overall Project cost and not bid as a separate Work item.
	1. STORMWATER RUNOFF
		1. Stormwater Control – General:
			1. Provide methods to control stormwater runoff (surface drainage) and water from excavations and structures to prevent damage to the Work, the Site, and adjoining properties.
			2. Control fill, grading, and ditching to direct water away from excavations, pits, tunnels and other construction areas and to direct drainage to proper runoff courses to prevent erosion, damage, or nuisance.
		2. Equipment and Facilities for Stormwater Control: Provide, operate, and maintain equipment and facilities of adequate size to control storm water runoff.
		3. The Contractor shall at all times during construction provide and maintain ample means and devices with which to remove promptly and dispose of properly all stormwater runoff entering the excavations or other parts of the Work and shall keep said excavations dry until the structures to be built or pipelines to be placed therein are completed. No stormwater shall be allowed to rise over or come in contact with masonry until the concrete and mortar have attained a satisfactory set, except in cases where the concrete has been tremied into place with the approval of the Engineer. In water bearing sand, well points and/or sheeting shall be supplied, together with pumps and other appurtenances of ample capacity to keep the excavation free of stormwater.
		4. Discharge and Disposal: Dispose of stormwater in manner to prevent flooding, erosion, and other damage to any and all parts of the Site and adjoining areas, and that conforms to Laws and Regulations.
			1. Water used for working or processing, resulting from dewatering operations, or containing oils or sediments that will reduce the quality of the water downstream of the point of discharge, shall not be directly discharged. Such waters shall be diverted through a settling basin, filter or other approved method, before being discharged.
			2. Contractor will be held responsible for the condition of any pipe, conduit or channel used for drainage purposes and all such pipes, conduits or channels shall be left clean and free of sediment.
	2. EROSION CONTROL
		1. Erosion Control – General:
			1. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
			2. Hold to a minimum the areas of bare soil exposed at one time.
			3. Provide temporary control measures such as berms, dikes, and drains.
			4. Construct fills and waste areas by selective placement to reduce surface silts or clays that will erode.
			5. Periodically inspect earthwork to detect evidence of the start of erosion; apply corrective measures as required to control erosion. Continue inspections and corrective measures until permanent vegetation has been established.
			6. The Contractor shall maintain drainage flow at all times through any ditches disturbed during construction. The Contractor shall minimize disturbance and sedimentation due to excavation in ditches and shall restore the ditches to their original condition and performance.
			7. Periodically inspect impacted ditches and streams to detect evidence of the start of erosion; apply corrective measures as required to control erosion. Continue inspections and corrective measures until permanent erosion control and vegetation have been established.

NTS: Note that B.1 references permit and/or erosion requirements in construction documents. Edit as needed to match where permit requirements are listed. Include copy of City obtained permit.

* + 1. Erosion Control Permit (SWPPP):
			1. Contractor shall comply with the 327 IAC 15-5 “Stormwater Run-Off Associated with Construction Activity” permit, as provided by the Owner and as shown or specified in the construction documents.
			2. Contractor shall follow the Indiana Storm Water Quality Manual.
			3. Contractor shall submit proof of approved erosion control plans for excavated materials disposal site.
			4. Contractor shall install and maintain erosion control around stockpiles of granular material using gravel filled bags.
			5. Contractor shall install and maintain erosion control around existing and newly constructed inlets downstream from construction activity.
			6. Contractor shall furnish, install, and maintain erosion control measures such as silt fences and temporary seeding and sodding on all disturbed areas.
			7. Contractor to minimize granular deposits on the street surfaces and sidewalks, open to traffic. Excess material shall be removed at end of workday by approved methods. (i.e. street sweeper, brooming). Contractor shall not remove material by flushing street with water.
			8. Contractor shall post a copy of the Notice of Intent letter on project board at the Site or other approved highly visible location on Site.
			9. Contractor shall provide a trained individual to oversee the installation and maintenance of erosion and sedimentation control.
			10. Contractor to inspect, repair, and maintain erosion and sedimentation control a minimum of once each week or by the end of the next business day after a storm event greater than 0.5” of rainfall in 24 hours. A trained individual shall prepare a written evaluation of each inspection, repair, and maintenance performed. The evaluation must include: the name of the individual performing the evaluation; the date of the evaluation; problems identified at the project site; and details of corrective actions recommended and completed.
			11. Corrective actions required, as a result of an inspection or control measure failure shall be scheduled within 24 hours of inspection or failure.
			12. Contractor shall make the Construction Drawings and inspection reports available upon request.
			13. Contractor to record any revisions to the Storm Water Pollution Prevention Plan.
			14. Areas to be left inactive for 15 days or more to be treated with temporary or permanent seeding or sodding.
			15. If provisions of these specifications conflict with provisions of the Standard Specifications the provisions of this specification will govern.

NTS: Delete Article “1.7” below if project doesn’t not contain permanent erosion control measures. This article is intended for projects where maintenance of the permeant erosion control feature is needed. Edit as required for project.

* 1. WARRANTY
		1. General Warranty: The special warranties specified in this Section shall not deprive Owner of other rights or remedies that Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties required by Contractor under the Contract Documents.

NTS: Edit Paragraph “B” below based on permeant erosion control measure that requires extended maintenance.

* + 1. Special Warranties: The Contractor shall guarantee a good stand vegetation that is part of permanent erosion controls, by watering, regrading and reseeding eroded areas and otherwise maintaining all permanent erosion controls until final acceptance. Any areas which do not show uniform growth or has bare spots shall be replanted and repaired at the Contractor’s expense with the plantings and materials as originally used thereon and such replanting and repairs shall be repeated until all affected areas are repaired. Final acceptance of all permanent erosion control measures may be required by the Contractor after 60 days from the date of installation. The above does not release the Contractor from the standard provisions included in the Guaranty or Maintenance Bond agreement.
	1. MAINTENANCE
		1. Contractor shall maintain erosion controls during Contractor warranty period. Including inspections after rain events, and restoration to original design condition as required.
1. PRODUCTS

NTS: This section provides general materials for site control during construction, including controls for stormwater runoff, sedimentation, and erosion. Edit requirements to include additional products or remove information not applicable to the project as necessary. Both temporary and permanent erosion control measures are listed, coordinate with the Drawings as required to make clear the permanent erosion control methods required for the project.

* 1. GENERAL-EROSION AND CONTROL
		1. All erosion control products shall be in accordance with the Indiana Department of Transportation Standards Specifications (INDOTSS).
		2. All materials provided under this Specification shall meet the requirements of the applicable sections of the Indiana Department of Transportation Standards Specifications (INDOTSS), latest edition or Indiana Storm Water Quality Handbook.

NTS: Provide available details for control measures listed below on Drawings. If details are not to be provided, add additional specifications below to include required minimum thicknesses and layout dimensions. Designer must include specific design specification, notes, and details for any unique features or site conditions to be included in the project.

* 1. SITE PREPARATION

NTS: If required to maintain site drainage or flows in existing side ditches, specifier shall include details and specifications for the installation of a culvert under the construction entrance. Minimum allowable culvert size is 15”.

* + 1. Temporary Construction Entrance
			1. Construction of temporary construction entrances shall conform to the details provided in the Contract Documents.
			2. Manufactures: The following geosynthetic material will be accepted:
				1. Mirafi HP270
				2. Or equal
			3. A woven geotextile fabric shall be installed for separation of subbase and base aggregate materials. Refer to Section 31 05 19-Geosynthetics for Earthwork for geotextile fabric requirements. :
			4. Base aggregate material shall consist of INDOT #2 aggregate and capped with INDOT #5 aggregate. Thickness of each aggregate layer shall conform to the dimensions indicated on the Drawings.
			5. Prior to installation, all vegetation shall be removed from foundation area.
			6. Foundation area shall be graded for positive drainage.
			7. Where possible, divert all stormwater runoff and drainage from the temporary construction entrance to a sediment trap or basin.

NTS: Delete if Trackout Control is not required for the Project. Trackout control specified below are metal plates that open the tread on tires to help shed the dirt from the tire. They are typically installed on an aggregate bed and need periodic cleaning to remove the debris buildup. Commonly, trackout plates are used for residential projects to help minimize dirt and sediment being deposited on the road way. If used on a project specific the location on the erosion control plan.

* + 1. Material Trackout Control
			1. Install rattle grate to keep mud, dirt, and debris from leaving the jobsite.
			2. rate shall be sized to handle all outgoing wheeled vehicle traffic. Conduct regular maintenance and remove debris build up. Grate shall be installed per manufacturer’s recommendation.

NTS: Edit “C” below to require the use of either standard strength or extra strength synthetic filter fabrics as sediment barriers.

* + 1. Temporary Perimeter Protection - Silt Fence
			1. Construction of sediment barriers shall conform to the details provided in the Contract Documents.
			2. Sediment barriers shall be designed and used in situations in which only sheet or overland flows are expected.

Provide woven geotextile fabrics for use in sediment barriers. Refer to Section 31 05 19-Geosynthetics for Earthwork for geotextile fabric requirements.

* + - 1. Sediment barriers shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.
			2. Sediment barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
			3. Should the sediment barrier decompose or become ineffective prior to the upslope area being permanently stabilized, the barrier shall be replaced promptly.
			4. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.
			5. Any sediment deposits remaining, in place, after the barrier has been removed shall be dressed to conform to the existing grade, prepared, and seeded.
		1. Temporary Perimeter Protection - Filter Sock
			1. Manufactures: The following proprietary sediment control devices will be accepted for use as perimeter protection:
				1. Filtrexx Sediment Control
				2. Or equal
			2. Construction of sediment barriers shall conform to the details provided in the contract documents.
			3. Sediment barriers shall be used and installed as recommended by the manufacturer.
			4. Filtrexx Sediment Control Soxx for use in sediment barriers shall conform to the following table:

NTS: Edit table below based on project requirements. Designer shall specify required diameter and material type, based on manufacturers design tool. Remove unused material types.

|  |
| --- |
| **Filtrexx Sediment Control**  |
| **Filtrexx Soxx Material** |
| Material Type  | 3mil HDPE | 5mil HDPE | 5mil HDPE | Multi-Filament Polypropylene (MFPP) | Multi-Filament Polypropylene Safety Soxx |
| Material Characteristics | Photodegradable | Photodegradable | Biodegradable | Photodegradable | Photodegradable |
| Design Diameters (inch) | 581218 | 5812182432 | 812182432 | 812182432 | 812182432 |
| Mesh Opening (inch) | ⅜ | ⅜ | ⅜ | ⅜ | ⅛ |
| Tensile Strength (psi) | ND | 26 | 26 | 44 | 202 |
| % Original Strength form Ultraviolet Exposure (ASTM G-155) | 23% at 1,000 hr | 23% at 1,000 hr | ND | 100% at 1,000 hr | 100% at 1,000 hr |
| Functional Longevity/Project Duration | 6 mo–2 yr | 9 mo–3 yr | 6 –12 months | 1 –4 year | 2 –5 year |

* + - 1. Filtrexx Sediment Control Soxx shall contain a coarse composted material that is a Certified Filtrexx Filter Media.
			2. Sediment barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
			3. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.
			4. Any sediment deposits remaining, in place, after the barrier has been removed shall be dressed to conform to the existing grade, prepared, and seeded.

NTS: Edit Number 9 if different disposal method is required for project.

* + - 1. Filtrexx Sediment Control, including Filtrexx Filter Media, shall be properly disposed of offsite.

NTS: Designer shall select location and design requirements of concrete washout area based on site and construction conditions. Designer shall review City of Fort Wayne Standard Details and Specifications below for conformance with selected design.

NTS: If a prefabricated concrete washout system is to be allowed, edit specifications below as required.

* 1. CONCRETE WASHOUT AREA
		1. General
			1. A concrete washout location shall be designated and a system shall be implemented to reduce the discharge of pollutants associated with concrete washout waste.
			2. Construction/Installation of a concrete washout system shall be complete prior to concrete delivery.
			3. Do not wash out concrete trucks or equipment into storm drains, wetlands, streams, rivers, creeks, ditches, or streets.
			4. Signage shall be installed to designate location of concrete washout system.
			5. Concrete washout system shall conform to the details on the Drawings.
			6. Washout system shall utilize a pit or bermed area designed and maintained at a capacity to contain all liquid and concrete waste generated by washout operations, between scheduled cleanout periods.
			7. Pit shall be lined with ten millimeter polyethylene lining to control seepage.
			8. Place flags, safety fencing, or equivalent to provide a barrier to construction equipment and other traffic.
			9. Inspect the overall washout system daily for leaks, spills, tracking of soil by equipment, lining failure, and hardened concrete.
			10. Once concrete wastes have hardened, remove and dispose off-site.
			11. Excess concrete shall be removed when the washout system reaches 50 percent of the design capacity.
			12. Replace the plastic liner after each cleaning of the concrete washout system.
			13. Concrete washout systems shall be cleaned, removed, filled, graded, and stabilized at the completion of concrete operations.

NTS: Article 2.4 below is intended for use on areas with a 2/1 slope or less. Short-term blankets are intended for installations of less than 6 months and long-term blankets are intended for installations of 6 – 12 months. Engineer shall designate type of erosion control blanket required for each installation. Provide additional requirements for slopes steeper than 2/1 and for installations longer than 12 months. Engineer shall include City standard details for short-term and long-term installations and include details for other installations as required.

NTS: Erosion control blankets may be utilized as a temporary or permanent erosion control method. Article “2.4” below does not differentiate between a permanent or temporary installation. If the project requires differences between permanent and temporary installations, edit Article “2.4” below.

NTS: If project includes both temporary and erosion control blankets, coordinate with drawings and make clear which structures are to remain after construction

* 1. EROSION CONTROL BLANKETS
		1. Short-term (less than 6 month functional longevity) Erosion Control Blankets.
			1. The blanket shall be 100% straw fiber matrix.
			2. Stitching shall be photodegradable thread.
			3. The blanket shall be double-net construction.
			4. Contractor shall prepare soil according to the grading, seeding, fertilization and restoration requirements of the contract documents, prior installing erosion control blankets.
			5. Installation of erosion control blankets shall conform to the details provided in the Contract Documents.
			6. Anchoring shall be by means of 6” to 12” staples or pins and installed per manufacturers recommendations for specific application.
			7. The blanket shall conform to the minimum requirements listed in the following table:

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| --- |
| **Erosion Control Blanket Requirements** |
| **Short-Term Installation (Less than 6 Months Functional Longevity)** |
| Physical Property | Unit | Min. Value |
| Top Net Weight | lbs/1,000 ft2 | 1.5 |
| Straw Fiber Density | lbs/yd2 | 0.5 |
| Bottom Net Weight | lbs/1,000 ft2 | 1.5 |
| Anchoring | Anchors/yd2 | 1.5 |

* + 1. Long-term (more than 12 month functional longevity) Erosion Control Blankets.
			1. The blanket shall be constructed of straw fiber and coconut fiber combination, with a minimum coconut content of 30%.
			2. Stitching shall be photodegradable thread.
			3. The blanket shall be double-net construction.
			4. Contractor shall prepare soil according to the grading, seeding, fertilization and restoration requirements of the contract documents, prior installing erosion control blankets.
			5. Installation of erosion control blankets shall conform to the details provided in the Contract Documents.
			6. Anchoring shall be by means of 8” to 12” staples or pins and installed per manufacturers recommendations for specific application.
			7. The blanket shall conform to the minimum requirements listed in the following table:

|  |
| --- |
| **Erosion Control Blanket Requirements** |
| **Long-Term Installation (6 - 12 Months Functional Longevity)** |
| Physical Property | Unit | Min. Value |
| Top Net Weight | lbs/1,000 ft2 | 3 |
| Straw Fiber Density | lbs/yd2 | 0.35 |
| Coconut Fiber Density | lbs/yd2 | 0.15 |
| Bottom Net Weight | lbs/1,000 ft2 | 1.5 |
| Anchoring | Anchors/yd2 | 2 |

NTS: Rock check dams may be utilized as a temporary or permanent erosion control method. Article “2.5” below does not differentiate between a permanent or temporary installation. If the project requires differences between permanent and temporary installations, edit Article “2.5” below.

* 1. CHECK DAMS

NTS: HDPE check dams are intended as a temporary product until the vegetation has been established. Coordinate location of temporary check dams with the erosion control plan. Coordinate locations on drawings and make clear which structures are to remain after construction. HDPE check dams are used to provide velocity reductions, particle settling, and assists in the reduction of erosive forces and can be used as an alternative to rock check dams and straw bales. GeoRidge is one acceptable example of a HDPE check dam.

* + 1. HDPE CHECK DAMS
			1. Provide temporary HDPE check dams as indicated on Drawings.
			2. Materials
				1. Check dam shall be made of injection molded UV stabilized HDPE. Provide the following:

Georidge Standard as manufactured by Nilex.

Or equal.

* + - * 1. Provide 10” metal anchor spikes.
			1. Installation:
				1. Follow manufacturer’s recommended installation procedures.
				2. A section of erosion control blanket shall be placed transverse to the flow line direction of the ditch prior to the installation of the HDPE check dam. The length of the section shall extend from the top of one side of the ditch to the top of the opposite side of the ditch, while the width of the section shall be one roll width of the blanket or no less than 4 ft.
				3. The upstream edge of the erosion control blanket shall be secured in a 4” trench. The blanket shall be secured in the trench with 6” minimum staples placed at 1.67 ft intervals along the edge before the trench is backfilled.
				4. Once the upstream edge of the blanket is secured, the downstream edge shall be secured with 6” minimum staples placed at 1 ft intervals along the edge. The HDPE check dam shall be installed in the middle of the erosion control blanket. Re-compact the soil in the trench.
				5. For multiple HDPE check dam panels in the same row, overlap panels a minimum 2”. Cut a slot in the crest of the overlapping berm to allow contact between the foot of the berm and the soil.
				6. Anchor HDPE check dam with a 10” metal spikes. Anchor spacing depends on soil condition and density. Minimum recommendation is 3 anchors on the upstream side and 2 anchors on the downstream side. Install to prevent water from going around or under the HDPE check dam.
				7. Subsequent panels shall extend both across the bottom of the ditch and opposite the side slope, as well as up the original backslope or side slope at the distance determined by the Engineer.

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| --- |
| **HDPE Check Dam Spacing** |
| **Gradient** | **Spacing** |
| 1% | 75.0 |
| 2% | 37.5 |
| 3% | 25.0 |
| 4% | 19.0 |
| 5% | 15.0 |
| 6% | 12.5 |
| 7% | 10.5 |
| 8% | 9.5 |
| 9%  | 8.5 |
| 10% | 7.5 |

* + - 1. Maintenance:
				1. Contractor shall immediately notify Engineer if significant erosion occurs between dams.
				2. Remove accumulated sediment when it reaches one-half the height of the dam to maintain channel capacity, allow drainage through the dam, and prevent large flow from displacing sediment.
		1. ROCK CHECK DAMS

NTS: If project includes both temporary and permanent rock check dams, coordinate locations on drawings and make clear which structures are to remain after construction.

* + - 1. Provide rock check dams as indicated on Drawings.
			2. Materials
				1. A nonwoven geotextile fabric, shall be used for separation of subbase and base aggregate materials. Refer to Section 31 05 19-Geosynthetics for Earthwork for geotextile fabric requirements.
				2. The aggregate shall be as defined by INDOT Standards for revetment riprap, must be crushed stone and must meet the following gradations.

|  |
| --- |
| **INDOT Revetment Riprap Gradation** |
| **Size, In. (mm)** | **Revetment** |
| 30 (750) |   |
| 24 (600) |   |
| 18 (450) | 100 |
| 12 (300) | 90-100 |
| 8 (200) |   |
| 6 (150) | 20-40 |
| 3 (75) | 0-10 |
| 1 (25) |   |
|   |
| Depth of Riprap, minimum | 18 in. (450 mm) |

NTS: No. 3 below requires INDOT #5 aggregate. If INDOT #5 is not available, INDOT #8 aggregate may be used. Review availability and edit as required.

* + - * 1. The filter medium shall be well-graded INDOT #5 aggregate.
			1. Installation
				1. Excavate a cutoff trench into the channel bottom and ditch banks, extending it a minimum of 18 inches beyond the top of the ditch bank.
				2. Install and anchor filter fabric in the channel and cutoff trench.
				3. Place riprap in the cutoff trench and channel to the lines and dimensions shown on the Drawings. The center of each dam must be at least nine inches lower than the uppermost points of contact between the riprap dam and channel banks.
				4. Extend the riprap at least 18 inches beyond the top of the channel banks to keep overflow water from eroding areas adjacent to the channel banks before it re-enters the channel.
				5. Place filter medium (INDOT #5 aggregate) on the up-slope side of the dam. Place filter medium over the entire face of the dam up to the base of the overflow weir notch.
				6. Stabilize the channel above the uppermost dam.
			2. Maintenance
				1. Contractor shall immediately notify Engineer if significant erosion occurs between dams.
				2. Remove accumulated sediment when it reaches one-half the height of the dam to maintain channel capacity, allow drainage through the dam, and prevent large flow from displacing sediment.
				3. Add riprap and aggregate as needed to maintain design height and cross section of the dams.

NTS: If project includes permanent rock check dams, edit or remove paragraph “d.” below.

If project is to remove check dams at the end of project, include additional provisions as required for channel stabilization and rock check dam removal, prior to project completion. Add applicable requirements and limits of use for erosion control blankets, seeding, and rip rap.

* + - * 1. When dams are no longer needed, remove the riprap and aggregate and stabilize the channel banks.

NTS: Article 2.6 below provides requirements for inlet protection. Other methods of inlet protection are available. Edit Article 2.6 as required for project/site conditions.

* 1. TEMPORARY INLET PROTECTION

NTS: Temporary Inlet Protection – Latex Coir Inlet Filter was based off of Latex Bound Coir Mat – Inlet Protection. Edit Section below as required.

* + 1. Temporary Inlet Protection – Latex Coir Mat Inlet Filter
			1. Application:
				1. Inlet filter shall be installed at existing and new-construction storm sewer drop inlets, where area immediately surrounding inlet is paved.
			2. Material:
				1. Inlet filter shall be composed of 100% coir fiber bonded to a fiberglass mesh backing.
				2. Inlet filter shall be UV resistance for 500 hours per ASTM 4355.
				3. Filter inlet shall be able to pass 35 gpm in accordance with ASTM 1117.
			3. Installation
				1. Clean inlet grate from debris, ice, and snow.
				2. Inlet filter shall extend a minimum of 1 inch beyond the front and both curb ends.
				3. Position the inlet filter on the grate with the net side down, flush to the back edge and extending beyond the grate on the front and both sides. Attach inlet filter to the grate without lifting the grate cover.
				4. Secure inlet filter with 8 zip ties. Pull zip-ties tight to anchor inlet filter to the grate. Remove free end of zip ties and leave a 1-inch tail.
			4. Maintenance
				1. Sweep top and side of inlet filter to remove sediment and debris after each rain event.
				2. In case of standing water at inlet, sweep away built up debris and allow water to drain through the inlet.
		2. Temporary Inlet Protection – Geotextile Fabric
			1. Application
				1. Geotextile fabric inlet protection shall be installed at existing and new-construction storm sewer drop inlets, where area immediately surrounding inlet is not paved.
				2. Geotextile fabric inlet protection is not permitted for use where area immediately surrounding inlet is paved.
			2. Structure
				1. Inlet protection shall be constructed and installed in conformance with the details provided in the contract documents.
				2. Structure shall be constructed to a height 12” to 18” above the top of the storm drain inlet; maximum post spacing is 36”.

Geotextile fabric shall be woven. Refer to Section 31 05 19-Geosynthetics for Earthwork for geotextile fabric requirements.

* + - * 1. Structure shall be constructed and braced as required to withstand 1 ½ foot head of water and sediment without collapsing or undercutting.
				2. Pre-manufactured and site constructed structures, meeting the requirements of this specification and details provided in the Drawings, are permitted.
			1. Installation
				1. Inlet protection installation shall conform to the requirements of the details provided in the contract documents.
			2. Maintenance
				1. Inspect all inlet protection controls daily and make required repairs immediately.
				2. Remove sediment when it has accumulated to four inches anywhere along the inlet protection.
				3. All sediment shall be removed and disposed of off-site.
				4. When contributing drainage area has been stabilized, remove inlet protection, remove sediment, grade area to the required elevation and stabilize immediately.
				5. If area around inlet is to be paved, prior to stabilization of all contributing drainage area, remove and replace inlet protection with an inlet protection approved for paved areas.
		1. Temporary Inlet Protection – Sediment Control Sack
			1. Application
				1. Temporary sediment control sacks shall only be installed at all existing and new-construction storm sewer inlets and catch basins, where area immediately surrounding inlet is paved.
				2. Temporary sediment control sacks are not permitted for use where area immediately surrounding inlet is not paved.
			2. General
				1. Temporary sediment control sacks shall be proprietary devices and shall be submitted for approval prior to installation.
				2. Proprietary inlet protection devices shall provide a filtering efficiency that removes at least 80% of the Total Suspended Solids.
				3. Proprietary devices shall not slow the runoff into the structure such that ponding occurs on the travel lanes of street.
				4. Temporary sediment control sacks shall include framework or basket.
				5. Inlet protection shall be designed and installed with a bypass to allow stormwater to flow into the storm system during excessive storm events.
				6. Inlet protection shall be designed and installed with dumping straps to allow for ease of maintenance.
			3. Material
				1. Frame or basket shall have a top width and length such that it will fit into the inlet and be supported by the inlet, grate, or storm sewer.
				2. Temporary sediment control sacks shall only be used for the specific type of inlet they were designed and recommended by the manufacturer.
			4. Installation
				1. Inlet protection installation shall conform to the manufacturer requirements for each specific type of inlet or catch basin.
			5. Maintenance
				1. Inspect all inlet protection controls daily and make required repairs immediately.
				2. Remove accumulated sediment and debris after each storm event.
				3. Remove sediment when it has accumulated to four inches in the sediment control sack.
				4. All sediment shall be removed and disposed of off-site.
				5. Inlet protection devices shall be removed when contributing drainage area has been stabilized.

NTS: Stone Bag Inlet Protection is intended for use with a drainage area of 1 acre or less per inlet. Additional design considerations are required for larger drainage areas.

* + 1. Temporary Inlet Protection – Stone Bags
			1. Application
				1. The use of stone bag inlet protection is permitted at existing and new-construction storm sewer drop inlets and curb inlets, in both paved and un-paved areas.
			2. Structure
				1. Stone bag inlet protection shall be constructed and installed in conformance with the details provided in the contract documents.
				2. Structure shall be constructed to a height of one to three layers of bags (as necessary).
				3. Structure shall be constructed to surround storm drain inlets in sump (depression) areas or to a minimum of three feet long at the up-slope side of storm drain inlets and curb inlets (as necessary).
			3. Materials
				1. Bags shall be constructed of non-woven geotextile fabric.
				2. Traffic Barricades – As needed, to prevent vehicles from hitting the barrier.
				3. INDOT #5 washed aggregate. Aggregate must be larger than storm sewer grate openings.
			4. Installation
				1. Inlet protection installation shall conform to the requirements of the details provided in the contract documents.
				2. Where bags meet existing curbs, overlap bags onto curb, at least half a bag in length.
				3. Additional layers of bags shall be overlapping with the layer below, with staggered joints.
				4. Construct a spillway as shown on the Drawings.
			5. Maintenance
				1. Inspect all inlet protection controls daily and make required repairs immediately.
				2. Remove sediment when it has accumulated to four inches anywhere along the inlet protection.
				3. All sediment shall be removed and disposed of off-site.
				4. When contributing drainage area has been stabilized, remove inlet protection, remove sediment, grade unpaved areas to the required elevation and stabilize immediately.

NTS: Filtrexx Inlet Protection is intended for use with a drainage area of 1 acre or less per inlet. Additional design considerations are required for larger drainage areas.

* + 1. Temporary Inlet Protection – Filter Sock
			1. Inlet Protection- Filtrexx Inlet Protection
				1. Manufactures: The following proprietary sediment control devices will be accepted for use as inlet protection:

Filtrexx Inlet Protection

Or equal

* + - * 1. Inlet protection shall be used and installed as recommended by the manufacture.
				2. Filtrexx Soxx for use in inlet protection shall conform to the following table:

NTS: Edit table below based on project requirements. Designer shall specify required diameter based on manufactures design tool. Remove unused material types.

|  |
| --- |
| **Filtrexx Inlet Protection**  |
| **Filtrexx Soxx Material** |
| Material Type  | 3mil HDPE | 5mil HDPE | 5mil HDPE | Multi-Filament Polypropylene (MFPP) | Multi-Filament Polypropylene Safety Soxx |
| Material Characteristics | Photodegradable | Photodegradable | Biodegradable | Photodegradable | Photodegradable |
| Design Diameters (inch) | 581218 | 5812182432 | 812182432 | 812182432 | 812182432 |
| Mesh Opening (inch) | ⅜ | ⅜ | ⅜ | ⅜ | ⅛ |
| Tensile Strength (psi) | ND | 26 | 26 | 44 | 202 |
| % Original Strength from Ultraviolet Exposure (ASTM G-155) | 23% at 1,000 hr | 23% at 1,000 hr | ND | 100% at 1,000 hr | 100% at 1,000 hr |
| Functional Longevity/Project Duration | 6 mo–2 yr | 9 mo–3 yr | 6 –12 months | 1 –4 year | 2 –5 year |

* + - * 1. Filtrexx Inlet Control Soxx shall contain a coarse composted material that is a Certified Filtrexx Filter Media.
				2. Sediment barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
				3. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.
				4. Any sediment deposits remaining, in place, after the barrier has been removed shall be removed offsite.
				5. Filtrexx Inlet Control including Filtrexx Filter Media, shall be properly disposed of offsite.

NTS: Temporary sediment traps are intended for use with a drainage area of 5 acres or less. Additional design considerations are required for larger drainage areas.

* 1. TEMPORARY SEDIMENT TRAP
		1. General
			1. Temporary sediment traps shall be installed at outlets of pipes, culverts, conduits, and channels, as indicated on the Drawings.
			2. Dimensions and layouts of sediment traps shall be determined by flow capacity and velocity of storm discharge and shall be as indicated on the Drawings.
			3. Sedimentation basins shall be formed by construction of a compacted embankment and/or excavated basin.
			4. A nonwoven geotextile fabric shall be installed for separation of embankment and aggregate materials.
		2. Material

Geotextile fabric shall be non-woven. Refer to Section 31 05 19-Geosynthetics for Earthwork for geotextile fabric requirements.

* + - 1. The riprap shall be as defined by INDOT Standards for revetment riprap and meet the following gradations.

|  |
| --- |
| **INDOT Revetment Riprap Gradation** |
| **Size, In. (mm)** | **Revetment** |
| 30 (750) |   |
| 24 (600) |   |
| 18 (450) | 100 |
| 12 (300) | 90-100 |
| 8 (200) |   |
| 6 (150) | 20-40 |
| 3 (75) | 0-10 |
| 1 (25) |   |
|   |
| Depth of Riprap, minimum | 18 in. (450 mm) |

NTS: No. 3 below requires INDOT #5 aggregate. If INDOT #5 is not available, INDOT #8 aggregate may be used. Review availability and edit as required.

* + - 1. The filter medium shall be well-graded INDOT #5 aggregate.
		1. Installation
			1. Clear, grub, and strip all vegetation and root material from the embankment area.
			2. Construct the embankment in six to eight inch lifts, compacting each lift as it is placed. At the time of placement, soil material must be wet enough to form a ball without crumbling and not so wet that water can be squeezed out of it.
			3. Construct embankment six inches above design elevation to allow for settling.
			4. Excavate a trapezoidal outlet section in the compacted embankment. Excavate the outlet section to the base of the pool area.
			5. Place geotextile fabric in the outlet section, extending the fabric up the sides to the top of the embankment.
			6. Install rip rap per the line and grade, as indicated on the Drawings.
			7. Immediately repair any geotextile fabric that tears during riprap installation. Repair by laying and stapling a piece of fabric over the damaged area and overlapping the edges by a minimum of 12”.
			8. Cover the upstream face of the riprap outlet section with a 12-inch thick layer of INDOT #5 aggregate.
			9. Construct a small plunge pool within the outlet apron to collect sediment.
			10. Stabilize the embankment with seed, mulch, or other approved erosion resistant cover.
		2. Maintenance
			1. Inspect for stone displacement and replace stones as required.
			2. Inspect for erosion or scouring around the sides of embankment and pool area; repair as needed.
			3. Remove sediment when it has accumulated to one-half the design volume.
			4. All sediment shall be removed and disposed of off-site.
			5. Replace spillway aggregate facing if the sediment pool does not drain within 48 to 72 hours following a stormwater runoff event.
			6. Temporary sedimentation basins shall be removed when contributing drainage area has been stabilized.
	1. TEMPORARY SEDIMENT CONTROL DEWATERING BAG
		1. General
			1. A temporary sediment control dewatering bag shall be installed at the discharge point of all dewatering pipes and hoses.
			2. Dewatering bags shall be proprietary devices and shall be submitted for approval prior to installation.
			3. Proprietary dewatering bags shall provide a filtering efficiency that removes at least 80% of the Total Suspended Solids.
		2. Material
			1. Dewatering bags shall be made of non-woven geotextile fabric and shall be constructed specifically for the purpose of sediment control from dewatering pipes and hoses.
			2. Geotextile fabrics shall be non-woven. Refer to Section 31 05 19-Geosynthetics for Earthwork for geotextile fabric requirements.
		3. Installation
			1. Dewatering bag installation shall conform to the manufacturer recommendations.
			2. Dewatering bags should only be used on pipe or hoses sizes that they were specifically designed for.
			3. Dewatering bags shall be placed on an aggregate underlayment for stabilization.
			4. A nonwoven geotextile fabric shall be installed for separation of sub-base and aggregate underlayment. Geotextile fabrics shall conform to the following table:

|  |
| --- |
| **Non-Woven Geotextile Fabric Requirements** |
| **Dewatering Bag Aggregate Underlayment Installation** |
| Physical Property | Test Method | Unit | Min. Value |
| Grab Tensile Strength | ASTM D 4632 | lbs. | 200 |
| Grab Tensile Elongation | ASTM D 4632 | % | 50 |
| Puncture Strength | ASTM D 4833 | lbs. | 500 |
| Apparent Opening Size (AOS) | ASTM D 4751 | U.S. Sieve | #80 |
| Flow Rate | ASTM D 4491 | gal/min/ft2 | 95 |

* + 1. Maintenance
			1. Remove accumulated sediment when the bag is half full of sediment or as required to maintain the capacity of the dewatering system.
			2. All sediment shall be removed and disposed of off-site.
			3. Dewatering bags shall be removed from the Site at the completion of dewatering and shall not be buried or left on Site.

NTS: River or lake shore protection may be utilized as a temporary or permanent erosion control method. Article “2.9” below does not differentiate between a permanent or temporary installation. If the project requires differences between permanent and temporary installations, edit Article “2.9” below.

NTS: If project includes both temporary and permanent river or lake shore protection, coordinate with drawings and make clear which structures are to remain after construction.

* 1. RIVER/LAKE SHORE PROTECTION

NTS: Coir logs can be specified with or without erosion control blankets. Engineer shall designate installation requirements. If an erosion control blanket is required, use requirements of long-term erosion control blankets, listed in Section 2.4.

NTS: Coir logs can be specified as vegetated or non-vegetated installations. Engineer shall designate installation requirements. If a vegetated installation is required, engineer shall specify planting requirements.

NTS: Required spacing is dependent on site conditions and river/lake shore bank slope. Engineer shall designate installation spacing and other requirements as necessary.

* + 1. River/Lake Shore Protection – Coir Logs
			1. Coir logs shall have a minimum diameter of 6 inches.
			2. Coir logs shall be 100% decorticated coconut fibers with minimum density of 3.5 lb/cubic foot.
			3. The netting shall be biodegradable with a life expectance of at least six months.

NTS: Review PART 3 EXECUTION and edit to comply with permit requirements for project

1. EXECUTION
	1. GENERAL INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL
		1. All erosion and sediment control items shall be installed in strict conformance with the manufacturer’s instructions for proprietary items. On-site construction methods shall conform to the Indiana Storm Water Quality Handbook.

NTS: If project includes permanent erosion control structures that are not to be constructed at the beginning of the project edit Paragraph “B” below. Consider adding additional paragraphs as necessary to clearly describe the Work.

* + 1. Prior to site work, erosion control measures shall be installed to control erosion and prevent sediment laden water from exiting the site. This shall include, but not be limited to, the installation of temporary earthen berms, silt fences, filter curtains, riprap, drainage piping, catch basins, inlet protection and other items that are needed to control sediment.
		2. Both temporary and final seeding is required. Should any areas outside of the project area remain inactive for a period of 15 days or more, it shall be seeded with a temporary or permanent vegetative cover such as oats, wheat or rye.
		3. Construction operations shall be carried out in such a manner and sequence that erosion shall be minimized and held within acceptable limits. It is important that material excavated from this Project be contained.
	1. INSPECTION AND MAINTENANCE SCHEDULE
		1. The Project area shall be inspected no less than once per week, and after every rainfall event greater than 0.5” in 24 hours. Deficiencies and damages to the erosion control measures must be rectified within 24 hours.
		2. An Inspection and Maintenance form or record log shall be kept by the Contractor.
		3. The following Erosion Control Schedule shall be used for this Project:

NTS: Add number of construction entrances to be included in this project

| CONTROL MEASURE | INSTALLATION SEQUENCE | INSPECTION AND MAINTENANCE |
| --- | --- | --- |
| Construction Entrance | Prior to Clearing and Grading | Minimum of (-) Entrances shall be Provided |
| Silt Fence Perimeter Protection | Prior to Clearing and Grading | Weekly, after Storm Events and as Needed |
| Existing Inlet/Drain Pipe Protection | Prior to Clearing and Grading | Weekly, after Storm Events and as Needed |
| Tree Protection | Along with Rough Grading | Weekly, after Storm Events and as Needed |
| Temporary Seeding | After Rough Grading | Water as Needed |
| Permanent Seeding | After Finish Grading | Water as Needed |
| Erosion Control Matting (Blankets) | After Finish Grading | Weekly, after Storm Events and as Needed |
| Inlet Protection | After Each Inlet is Placed | Weekly, after Storm Events and as Needed |
| Soil Stabilization (Seeding) | After Finish Grading Around Finished Inlets | Water as Needed |
| Removal of Inlet Protection | After All Areas Draining to These Areas Are Stabilized | N/A |
| Removal of Perimeter Protection | After All Areas Draining to These Areas Are Stabilized | N/A |

+ + END OF SECTION + +