

## SECTION 02490 – CONSTRUCTION SITE EROSION & SEDIMENT CONTROL

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## 1. GENERAL REQUIREMENTS

1.1 Summary. This section describes general requirements to prevent or minimize the pollution of rivers, streams, lakes, and wetlands caused by runoff from the construction zone. Such pollution includes sediment that may migrate offsite through the action of wind, water, or traffic, as well as chemical spills or other refuse from the site.

1.2 Contractor's Responsibility. The Contractor shall take all measures necessary to prevent the transport of sediment or pollutants from the project limits or into bodies of water that are intended for protection.

1.3 Compliance with NPDES Permits. The Owner shall obtain a National Pollutant Discharge Elimination System (NPDES) permit from Kansas Department of Health and Environment. The Owner shall provide the Contractor with a Stormwater Pollution Prevention Plan (SWPPP) which has been prepared by the Engineer or other qualified professional. The Contractor shall comply with all requirements of such permits and the SWPPP, and shall enforce compliance with such requirements by all Subcontractors. The Contractor and all Subcontractors shall certify in writing on the forms required by the permit that they understand and will comply with such permits.

1.4 Projects Not Requiring a Permit. If neither NPDES permit nor other local water pollution control permits are required for a project, the Engineer may waive certain documentation and record-keeping provisions of this specification. The Contractor is required to install such measures for erosion and pollution control as may be called for in the plan or ordered by the Engineer.

1.5 Stormwater Pollution Prevention Plan (SWPPP). The Stormwater Pollution Prevention Plan (SWPPP) outlines methods and controls to be used to prevent stormwater pollution from the construction activities.

The SWPPP consists of the following elements:

- (a) Title Page – Project Name, Location, Prepared By, Prepared For, Date, etc.
- (b) Overview of Project
- (c) Construction Site Description – Nature of Activity, Sequence of Construction Activities, Area of Disturbance, Proposed Runoff Coefficients for Site, Existing Soil & Storm Water Drainage Information, Site Map (drainage patterns, approximate slopes, areas of soil disturbance, controls, surface waters, storm water discharge locations), Name of Receiving Stream
- (d) Best Management Practices (BMPs) – Erosion & Sediment Control BMPs (stabilization and structural), Stormwater Management Controls (stormwater pollution controls, erosion controls), Other Controls (waste, excess concrete & wash water, hazardous materials, sanitary waste), Timing of Control Measures & Removal, Additional State or Local Requirements
- (e) Inventory of Materials & Substances to be On-Site during Construction (soil, aggregate, paint, concrete, lime, fly ash, fertilizers, solvents, toxicants, etc.)
- (f) Inspection & Maintenance Procedures – Maintenance, Inspection Frequency, Inspection Procedures, Procedures for Non-Compliance
- (g) Non-Storm Water Discharge – Water line flushing, pavement washing, etc.
- (h) Description of any Permanent Stormwater Management Features
- (i) Owner, Contractor, and Subcontractors Certifications
- (j) SWPPP Certification
- (k) NPDES permit documentation (NOI from KDHE)
- (l) Inspection and maintenance forms
- (m) Applicable Plan Drawings and Specifications

All elements of the project bid documents relating to erosion and pollution control are considered part of the SWPPP, either by direct inclusion or by reference, including plan sheets, specifications, special provisions, quantity tabulations, bid sheets, and contract documents. A copy of all NPDES and other water pollution related permits and permit applications are also part of the SWPPP. This specification is an integral part of the SWPPP.

1.6 Contractor Amendments to the SWPPP. Prior to beginning work, the Contractor shall review the SWPPP in detail and provide the Engineer with written recommendations for amendments to improve the effectiveness of the SWPPP or to bring it into better alignment with the Contractor's intended method of operations. The Contractor shall also advise the Engineer of any omissions or deficiencies they find in the SWPPP. During the progress of the job, the Contractor shall continue to monitor the effectiveness and performance of the control measures used and propose additional amendments as needed. No amendment shall be incorporated unless approved by the Engineer, and a log of such amendments shall be made by the Contractor. A copy of the SWPPP and all amendments shall be retained by the Contractor onsite and ready for inspection without notice.

1.7 Contractor Schedule. The Contractor shall provide the Engineer with a detailed schedule of work prior to beginning, which shall include information on timing, duration, and sequencing of erosion and sediment control measures and construction phasing. Once approved, such schedule shall become a part of the SWPPP, and changes to the schedule shall require amendment to the SWPPP.

1.8 Alternate Methods or Materials. The Contractor may propose alternative methods or materials for any of the specific erosion and sediment controls given in the SWPPP, provided that such methods provide equal or improved measures of control, as determined by the Engineer. If agreed to by the Contractor and Engineer, such alternates may be paid for at the contract unit price and quantity of the items being replaced. If such modification is not acceptable to either Contractor or Engineer, the alternate methods or materials shall be handled in accordance with the applicable provision of the Contract for changes in work or extra work.

1.9 Superintendent Training Required. The Contractor's resident superintendent shall have no less than 8 hours of formal training on erosion and sediment control within the last 24 months. Such training shall include the principles of erosion and sediment control, technical information on typical and/or innovative controls, and the contents of these specifications and related Standard Drawings and Design Criteria. The training must be taught by a professional engineer or other professional considered qualified by applicable regulatory agencies to prepare a SWPPP. Documentation of training shall be submitted to the Engineer upon request, prior to beginning work.

1.10 Duration of Contractor's Responsibility. The Contractor is responsible for water pollution control and permit compliance from the issuance of Notice to Proceed until final completion of the work and during any subsequent maintenance bond period. The Contractor will be released from responsibility for erosion and sediment control for any portion of the job for which a Notice of Termination has been submitted and accepted by the local permit authority, provided that the Contractor does not subsequently do work in such areas that create new disturbances. The notice of termination will not be submitted by the Owner until all permit requirements are met, which includes the requirement that final stabilization be achieved. Vegetation must have a density of at least 70% of the density of the undisturbed areas of the site.

1.11 Installation of Controls. The Contractor shall obey all requirements for chemical and waste controls specified in Subsection 2 of this Section. Contractor shall provide all specific erosion and sediment controls required by the SWPPP in accordance with the requirements of Subsections 3 and 4. If the SWPPP calls out items or controls not included in this specification, refer to the project special provisions and plans for requirements. Controls must be installed prior to or during the construction phase during which they are needed, not as a restoration or post-construction item.

1.12 Maintenance. The Contractor shall maintain the integrity of the temporary erosion and sediment control devices as long as they are in place and necessary. Devices not functioning properly shall be corrected or replaced. Accumulated sediments shall be removed promptly as detailed in Subsection 4.

1.13 Removal. Control measures shall be completely removed from the site when they are no longer needed, unless they are approved by the Engineer to remain in place for permanent stabilization or biodegradation (i.e. erosion control blankets).

1.14 Inspections. The Contractor shall inspect the construction site within twenty-four hours of a storm with precipitation of 0.5 inches or greater. In addition, regular inspections shall be made weekly during active phases of construction, and no less than once per month during all other times. All installed practices shall be checked for proper installation, operation, and maintenance. Locations where stormwater runoff leaves the site shall be inspected for evidence of erosion or sediment deposition. Deficiencies shall be noted in a report and corrected within seven calendar days of the inspection.

A report of each inspection shall be made and contain the following minimum information: inspector's name, date of inspection, effectiveness of the practices, actions taken or necessary to correct deficiencies, and listing of areas where construction operations have permanently or temporarily stopped. The inspection report shall be signed by the Superintendent or their designee. Site inspection reports shall be maintained onsite with the SWPPP.

1.15 Records. The Contractor shall maintain all permit required records during the job and shall transmit all necessary records to the Engineer at the completion of the work, including all Contractor and Subcontractor certifications, site inspection records, and other records requested by the Engineer.

1.16 Site Access for Inspections. The Contractor shall allow authorized personnel with proper credentials from jurisdictional federal, state, or local agencies, to enter the construction site to obtain samples of discharge water, to inspect and copy required records, and to inspect installed practices or equipment.

1.17 Maximum Areas of Disturbance at One Time. The surface area of erodible earth exposed shall be limited to the Contractor's capability and progress in keeping with the approved schedule. Existing vegetation will be preserved or retained as long as practical and the time period for soil areas to be without permanent surface or vegetative cover shall be minimized. The maximum surface area of erodible earth exposed at one time will not exceed ten (10) acres unless approved in writing by the Engineer or otherwise provided for in the plans. The Contractor shall pay close attention to the grading and disturbance limits indicated on the plan or authorized by the Engineer.

1.18 Measures Where Construction has Ceased. Soil stabilizing erosion control practices as detailed in Subsection 3 shall be implemented within 14 calendar days after construction activities have temporarily or permanently ceased on any portion of the site. Exceptions to this requirement are as follows: (a) If implementation of erosion

controls is precluded by snow cover, such measures shall be taken as soon as practical after snowmelt, or (b) a waiver to this requirement is justified and approved by the Engineer in writing, in which case sediment controls detailed in Subsection 4 must be maintained and a specific deadline for installing erosion controls be established.

1.19 Duration Limits for Select Activities. For certain items of work, the plans or standard sequences may contain specific time limits for the maximum duration of exposure, typically stated as "Item A construction shall have a maximum exposure time of X days." Where such limits are specified, the time will be measured from the date in which stabilized ground cover is first disturbed in the work area until the date that permanent or temporary stabilization is applied. At the Contractor's request, the count of days may be suspended for any interim period during which temporary stabilization is in place and adequately maintained. Contractor shall be responsible for documenting the elapsed time on all such work, typically by noting the elapsed time in their inspection logs, taking time-stamped photographs, and/or by marking the area with a wooden stake documenting beginning and ending dates. The Engineer may grant extensions of time requested by the Contractor when justified.

1.20 Construction near Rivers, Streams, and Waterbodies. Construction operations in or near rivers, streams, and other water impoundments will be restricted to those areas essential for construction. Unless otherwise provided for in the plans, a minimum 50 feet buffer of undisturbed vegetation will be maintained between construction operations and defined drainage courses. Where such buffers are not provided, work will not be initiated until all materials and equipment necessary to complete the work are on site and such operations will be completed as quickly as possible once the work has begun. When no longer required, all falsework, pilings, temporary crossings, and other obstructions will be promptly removed. Contractor shall not cross live streams with equipment but shall use temporary stream crossing as detailed in the plans.

1.21 Culverts, Ditches and Storm Sewers. Construction of major elements of the proposed storm sewer or other drainage systems shall be coordinated to minimize the duration of time over which stormwater would run through temporary, erodible channels. Unless otherwise indicated on the plans, construction of the major elements of the system shall be among the first activities on the project. Once begun, construction will proceed expeditiously to completion, including placement of all final headwalls, end structures, rip-rap and other end treatments. Temporary or permanent ditches which are graded on the project shall either be stabilized or have temporary sediment controls installed within seven (7) days of their grading.

1.22 Methods of Measurement. No separate measurements will be made for the general requirements covered by this Section.

1.23 Basis of Payment. Compliance with the general requirements of this section will not be paid separately, but shall be subsidiary to other items listed in the contract.

## 2. CHEMICAL AND WASTE CONTROLS

2.1 Summary. This section describes specific requirements to control non-sediment related pollutant discharges from chemicals and wastes from the site, including requirements for chemical handling, spill prevention, spill response, and waste disposal.

2.2 Solid, Liquid, and Hazardous Wastes. All trash shall be placed in dumpsters or trash barrels provided by the Contractor and accumulated trash shall be hauled offsite and properly disposed. Floating debris found in any waterbody on or immediately adjacent to construction shall be removed immediately, regardless of source. Hazardous wastes shall be stored, transported offsite, and disposed of properly.

2.3 Sanitary Wastes. Sanitary facilities must be made available and their use enforced by the Contractor.

2.4 Leak Prevention. All equipment used onsite shall be free of leaks, receive regular preventative maintenance, and be inspected daily to reduce chance of leakage. No fueling, servicing, maintenance, or repair of equipment shall be done within 50 feet of a stream, drainageway, lake, storm sewer inlet or other water body. Onsite fuel tanks shall be in good condition, free of leaks or drips, painted brightly for visibility, monitored daily and shall sit within a secondary containment tank or earthen berm.

2.5 Concrete Washout. Concrete wash or rinse water from concrete mixing equipment, tools and/or ready-mix trucks, tools, etc, may not be discharged into or be allowed to run directly into any existing water body or storm inlet. One or more locations for concrete wash out shall be designated on site, such that discharges during concrete washout will be contained in a small area where waste concrete can solidify in place and excess water evaporated or infiltrated into the ground.

2.6 Chemical Handling and Storage. Chemicals or materials capable of causing pollution may only be stored onsite in their original container. Materials stored outside must be in closed and sealed water-proof containers and located outside of drainage ways or areas subject to flooding. Manufacturer's data regarding proper use and storage, potential impacts to the environment if released, spill response, and federally-defined reportable quantities for spill reporting shall be maintained by the field superintendent onsite at all times. Locks and other means to prevent or reduce vandalism shall be used.

2.7 Herbicides, Pesticides and Fertilizers. Herbicides, pesticides and fertilizers used as part of the work shall be applied in accordance with manufacturer recommendations. Direct spray into water bodies is prohibited. Such chemicals shall not be used if rain is forecast within 24 hours, unless they're approved for wet weather application.

2.8 Spill Clean-up and Management. If safe, Contractor shall immediately stop and contain spills or leaks with an appropriate device, earthen berm, sawdust, sand, kitty litter, rags or other absorbents. Manufacturer recommendations shall be followed. Leaks from broken hoses shall be immediately contained with hose clamps, plugs, or drained into leak-proof containers. Contractor shall have tools, equipment, and supplies necessary for spill response onsite and ready for immediate use at all times. Contractor personnel shall be trained to properly respond to a leak or spill. All spills shall be cleaned up and disposed of in accordance with applicable federal, state, and local regulations. Local hazardous materials response units shall be called if assistance stopping or containing spill or leaks is needed.

2.9 Spill Reporting. All spills in excess of reportable quantities shall be reported to the appropriate federal, state, and local agencies within 24 hours of their occurrence. The Contractor shall maintain a listing of all such agencies onsite within the SWPPP and in easy reference for onsite personnel. Spills that pose an immediate threat to public safety or contamination of a water body shall be reported immediately to designated first response authorities.

2.10 Methods of Measurement: No separate measurements will be made for the requirements covered by this Section.

2.11 Basis of Payment. Compliance with the requirements of this section will not be paid separately, but shall be subsidiary to other items listed in the contract.

### 3. EROSION CONTROLS

Referenced Standards. The following standards are referenced in this section. The latest version of these standards shall be used.

City of Newton, Standard Drawings and Design Guidelines for Construction Site Erosion and Sediment Control Best Management Practices.

Texas Department of Transportation (TxDOT):

Approved Products List (APL) for Erosion Control. Based on testing and standards cited in the report "TXDOT / TTI Hydraulics, Sedimentation and Erosion Control Laboratory: Field Performance Testing of Selected Erosion Control Products". List available by writing the Texas Department of Transportation, Maintenance Division, Vegetation Management Section, 125 East 11<sup>th</sup> Street, Austin TX 78701 -2483 or by download from:

[http://www.dot.state.tx.us/services/maintenance/erosion\\_control.htm](http://www.dot.state.tx.us/services/maintenance/erosion_control.htm)

3.1 Summary. This section describes specific requirements for installation and maintenance of temporary measures to stabilize onsite soils and prevent erosion during construction.

3.2 Materials. Materials used for erosion controls shall meet the requirements of the following Subsections. Unless otherwise specified herein, the Contractor shall submit, for each material used, a certification prepared by the manufacturer which states that the materials meets all the requirements of this specification. The manufacturer must also provide supporting documentation and testing results to validate this certification, if requested by the Engineer. Manufacturer's instructions for installation of materials (when applicable) will be available onsite whenever work is occurring and a copy shall be submitted to the Engineer upon request.

3.3 Permanent Seeding and Sodding. Final stabilization with vegetation by either permanent seeding or sodding is the most effective form of erosion control and should be achieved as early in the construction process as possible.

- A. Materials, Construction Requirements and Maintenance: Permanent seeding or sodding shall be provided as specified in Section 02485. Contractor shall schedule work so that permanent seeding is conducted as early as practical in the construction process. Multiple mobilizations of seeding or sodding operations will be appropriate on most construction sites.
- B. Out-of-Season Special Provision: The Engineer may request that permanent seeding be conducted outside of the allowed season. If agreed to by the Contractor, Contractor shall be responsible for the establishment of a vigorous and healthy seed or sod cover. The Contractor shall be compensated for water necessary during period that falls outside the standard season.
- C. Measurement and Payment: "Permanent Seeding and Sodding" shall be measured per acre to two decimal places and paid for at the contract unit price. If out-of-season seeding or sodding has been authorized, then "Out of Season Watering" will be measured by the 1,000 gallon and paid for the contract unit price.

3.4 Temporary Seeding. Interim stabilization with annual vegetation to provide temporary cover to minimize erosion. This item only covers seeding installed by conventional drilling.

- A. **Materials:** Seed and equipment used for temporary seeding shall meet all the criteria given for permanent seeding in Section 02485 of the Standard Specifications.

Fertilizer is not required.

Mulch used for temporary seeding shall meet the same requirements as “mulch cover” in Subsection 3.5. Mulch is required unless erosion control blankets are being used instead.

Seed mixes are listed below. Actual weight of seed shall be adjusted for purity and germination rate to provide the minimum weight of pure, live seed listed.

1. Type T-1 Seed: This mixture will be used when temporary seeding is completed between February 1 and April 30, or between August 15 and October 31. The seed mixture and rate shall be as follows:

Premium Kansas blend Fescue @ 2.5 lbs PLS\* per 1,000 square feet, or  
Ryegrass (Annual) @ 2.5 lbs PLS\* per 1,000 square feet

2. Type T-2 Seed: This mixture will normally be used when temporary seeding requires heat tolerance and when seeding is completed between April 30 and August 15. The seed mixture and rate shall be as follows:

Millet @ 2 lbs PLS\* per 1,000 square feet

3. Type T-3 Seed: This mixture will normally be used when temporary seeding requires cold tolerance and when seeding is completed between October 31 and February 1. The seed mixture and rate shall be as follows:

Winter Wheat @ 3 lbs PLS\* per 1,000 square feet

\*PLS – Pure Live Seed

- B. **Construction Requirements:** Preparation, planting and all other construction requirements for temporary seeding shall be as specified for permanent seeding in Section 02485, except as modified herein. For this item, seeding shall be drilled (for Hydraulic application method, see Subsection 3.6). Prior to application, the soil shall be tilled to a depth of at least 2 inches and smoothed to eliminate gullies, depressions, or large clods. Roller compaction of the seedbed is not required. Within 24 hours of seeding, mulch or erosion control blankets shall be applied. When mulch is used, it shall be applied in accordance with the same requirements given for “Mulch Cover” in Subsection 3.5. When erosion control blankets are used, they shall be installed in accordance with the requirements Subsection 3.8. The Contractor shall initially water all areas of temporary seeding at least one-quarter inch as soon as the mulch is laid. Additional watering may be necessary for plant germination and adequate growth to provide cover. Contractor shall schedule work so as to provide temporary seeding as early as practical in the construction process. Contractor shall maintain a readiness to perform temporary seeding frequently during the

progress of the project. No more than 7 calendar days may elapse between the Engineer's request for temporary seeding and its application. Multiple mobilizations to seed areas as construction progresses shall be expected.

- C. Maintenance: Mulch shall be replaced or repaired as needed during germination and early growth. Bare spots shall be patched, by hand seeding if necessary. Vehicle and personnel traffic shall be minimized in areas seeded.
- D. Measurement and Payment: "Temporary Seeding" shall be measured per acre to two decimal places and paid for at the contract unit price. No differentiation shall be made for type of temporary seed used. Mulch and watering shall not be measured or paid for separately on any temporary seeding, but all such costs shall be subsidiary to the item. Erosion control blankets, when used, will be measured and paid separately as "Erosion Control Blanket."

3.5 Mulch Cover: Mulch applied without seeding to protect the soil surface from raindrop impact and reduce wind erosion and dust. Mulch Cover (without seed) is generally used when ground cover is required and temporary or permanent seeding is not feasible.

- A. Materials: Mulch shall be vegetative type only, consisting of cereal straw from stalks of oats, rye, wheat or barley and shall be free of prohibited and noxious weed seeds.
- B. Construction: Prior to applying mulch, the soil shall be tilled to a depth of 2 inches to eliminate hard crust and allow rainwater intercepted by mulch to infiltrate the soil. The surface will be smoothed to eliminate gullies, depressions, or large clods.

Mulch shall be applied at the rate of 1.5 tons/acre (3,000 lbs/acre) and be anchored into the soil a minimum depth of 3 inches by use of a heavy disc harrow, set nearly straight, or a similar approved tool. Discs of the anchoring tool shall be set approximately 9 inches apart. Anchoring shall be accomplished by not more than two passes of the tool. If approved by the Engineer, a tackifier may be applied to the mulch to anchor it instead of using the disc harrow.

- C. Maintenance: Mulch cover shall be replaced or repaired as needed. Bare spots shall be filled in, by hand if necessary. Vehicle and personnel traffic shall be minimized in areas mulched.
- D. Measurement and Payment: "Mulch Cover" will be measured per acre to two decimal places and paid for at the contract unit price. Mulch is not measured and paid separately when laid down in conjunction with seeding operations.

3.6 Hydrocover (Standard). Hydraulic application of a standardized mixture of fiber mulch, tackifier, and temporary seed to provide temporary cover.

- A. Materials:
  - 1. Cellulose Fiber Mulch: Shall be on the Approved Products List for Erosion Control by TxDOT. All fibers used shall correspond to the prequalified list for the appropriate soil type. Dry weight shall be based on "air-dry weight" that does not contain more than 10% moisture. The manufacturer's packaging shall indicate air-dry weight for each package of mulch. The fibers shall be colored green with a non-toxic dye.

2. Tackifier: Shall be food-grade hydrolyzed guar gum powder. It shall be mixed with the cellulose fibers based on the manufacturer's recommendations, but in no case at a proportion less than 3% of the dry weight of the cellulose fiber mulch.
3. Water: Shall be clean, potable water mixed at a rate suitable for the equipment being used, typically 100 gallons per every 30 to 50 pounds dry weight of cellulose fiber.
4. Seed: Shall be Type T-1 or T-2 seed as specified in Section 3.4. Seed shall be mixed to provide no less than the seeding rate provided.
5. Fertilizer: Not required.
6. Equipment: The hydrocover operation shall be accomplished with hydraulic sprayers suitable for mixing, spreading and projecting the mixture.

- B. Construction Requirements: The cellulose fiber mulch shall be added to the hydraulic seeder after proportionate amounts of seed, tackifier, and water have been mixed. These ingredients shall be mixed to form a slurry and applied at the rate indicated above. It shall be applied to make a uniform coverage of the soil surface. Prior to application, the soil shall be tilled to a depth of at least 2 inches and smoothed to eliminate gullies, depressions, or large clods.

Hydrocover shall be applied at a rate of 2,000 pounds dry weight of cellulose fiber per acre (0.41 pounds per square yard), unless otherwise specified by the Engineer. Once applied, the area shall be allowed to dry and vehicle and personnel traffic shall be kept off the stabilized area. Water shall be applied as needed for seed germination and plant growth.

Contractor shall maintain a readiness to provide hydrocover frequently during the progress of the project. No more than 7 calendar days may elapse between the Engineer's request for hydrocover and its application. Multiple mobilizations of hydrocover operations should be expected.

- C. Maintenance: Areas which are disturbed by construction shall be patched with additional application of slurry at the next available mobilization of equipment at no additional cost. Small areas of poor coverage may be stabilized through erosion control blankets, mulch for cover, straw wattle protection or other measures, at no additional cost.
- D. Measurement and Payment: "Hydrocover (Standard)" will be measured by the dry-weight in pounds of cellulose fiber used in the mixture and paid for at the contract unit price. No payment will be made for that portion of an application which exceeds 5% of the application rate required in this section or the plans unless otherwise approved by the Engineer. All other ingredients in the hydrocover mixture shall be subsidiary to the cellulose fiber. The minimum payment for a single mobilization of hydrocover operations shall be 50 pounds.

3.7 Hydrocover (Specialty Mix). Hydraulic application of specialized mixtures of fiber mulch, tackifiers, seed and other additives to provide temporary cover.

- A. Materials: When specialty mixtures are used, the particular mix design and ingredient requirements shall be given in the plans or special provisions. Such

specialty mixtures may include additives for improved seed germination, mixtures of special polymer tackifiers and heavier rates of cellulose fiber to produce a more continuous cover (i.e. "Bonded Fiber Matrix"), or mixtures that contain polyacrylamides that chemically stabilize the underlying soils (i.e. "Stabilized Fiber Matrix"). Seed, additives and equipment shall conform to the requirements of standard hydrocover, as well as any additional requirements specified in the plans, special provisions or by the manufacturer of the specialty mix.

- B. Construction and Maintenance Requirements: All construction and maintenance requirements shall be the same as for standard hydrocover, except as modified by the plans or the manufacturer's recommendation for the specialty mix.
- C. Measurement and Payment: "Hydrocover (Named Specialty Mix)" will be measured by the dry-weight in pounds of cellulose fiber used in the mixture and paid for at the contract unit price, where the name of the specific mixture shall be as given in the plans and bid. All other provisions of the measurement and payment shall be the same as for standard hydrocover.

3.8 Erosion Control Blanket. Blankets or mats of natural, synthetic, or composite materials that can be rolled onto bare earth and anchored in place to provide temporary or permanent cover and/or to stabilize bare earth or channels subject to overland or concentrated surface flow.

- A. Materials: Erosion control blankets of the class and type specified in the contract shall be on the Approved Products List for Erosion Control by TxDOT. Blankets are categorized by expected use and application, as follows:

Class 1: For use as Cover and Slope Protection from overland Flow:

- Type A: On slopes 1:3 or flatter with clay soils.
- Type B: On slopes 1:3 or flatter with sandy soils.
- Type C: On slopes steeper than 1:3 with clay soils.
- Type D: On slopes steeper than 1:3 with sandy soils.

Class 2: For use as Flexible Channel Liner under concentrated flow:

- Type E: For shear stresses below 2 lb/sq. ft.
- Type F: For shear stresses below 4 lb/sq. ft.
- Type G: For shear stresses below 6 lbs/sq. ft.
- Type H: For shear stresses below 8 lb/ sq. ft.
- Type I: For shear stresses below 10 lb/ sq. ft.
- Type J: For shear stresses below 12 lb/ sq. ft.

Only 100% synthetic materials are allowed for Type H, I, or J blankets

- B. Construction Requirements: The Contractor shall install erosion control blankets in the locations shown in the plans or as directed by the Engineer. Soil or seedbed preparation must be complete prior to the placement of blankets. Blankets shall be installed in a directional manner, anchored, lapped, and stapled as recommended by the manufacturer.
- C. Maintenance: Areas of torn or degraded blanket shall be repaired or replaced, unless such degradation is within the accepted tolerances for temporary blankets. Edges or seams which are loose or frayed shall be secured with additional staples. Bare patches of vegetation shall be reseeded.

- D. Measurement and Payment: "Erosion Control Blanket (Named Type)" shall be measured per square yard of sloped surface area covered and paid for at the contract unit price. Excess blanket used for overlap at seams, anchoring, waste, repairs, etc. will not be included in the measurement. When blankets are used in conjunction with permanent or temporary seeding, the temporary seeding operation shall be paid separately. The unit price for erosion control blanket will include any deductions for standard mulching that is no longer required.

3.9 Surface Roughening. At the end of every working day, the sloped face of any new excavation or embankment shall be roughened by operating tracked machinery up and down the slope to leave horizontal depressions in the slope face. As few passes of the machinery as possible should be made to minimize compaction. At no time shall slopes be bladed or scraped to produce a smooth hard surface.

Any rough graded slope that is not yet ready for seeding or other treatment and which will not be disturbed by ongoing construction for a period of 7 days or more shall be roughened by grooving it with a disc, tiller, spring harrow or other suitable implement. Such grooves shall be located traverse to the slope face and shall not be less than 3 inches deep nor spaced more than 15 inches apart. The requirement to roughen slopes by tracking or grooving shall apply to all slopes steeper than 6:1 horizontal to vertical. No measurement or payment shall be made for this item, but it shall be subsidiary to the earthwork.

3.10 Dust Control. Contractor shall take effective measures to prevent blowing dust. Adequate moisture content shall be maintained in all exposed soils by application of water or, in areas to be subsequently paved, by application of asphalt emulsion. When dust produced by operations such as sand blasting, grinding and sawing of concrete or masonry will create a public nuisance, contractor shall perform work under water spray or utilize an alternate construction method. No measurement or payment shall be made for this item, but it shall be subsidiary to other work.

#### 4. SEDIMENT CONTROLS AND DIVERSIONS

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

##### AASHTO

M 288 Geotextile Specification for Highway Applications

City of Newton, Standard Drawings and Design Guidelines for Construction Site Erosion and Sediment Control Best Management Practices.

##### ASTM

D 3786 - Test Method for Hydraulic Bursting Strength of Textile Fabrics –Diaphragm Bursting Strength Tester Method

D 4355 - Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

4.1 Summary. This section describes specific requirements for installation and maintenance of temporary measures to detain, filter, or cause settlement of sediment from runoff, as well as measures used to temporarily direct or divert runoff onsite or at the site perimeter.

4.2 Materials. Materials used for sediment controls and diversions shall meet the requirements of the following Subsections. Unless otherwise specified herein, the Contractor shall submit a certification prepared by the manufacturer for each material used which states that the materials meets all the requirements of this specification. The manufacturer must also provide supporting documentation and testing results to validate this certification, if requested by the Engineer. Manufacturer's instructions for installation of materials (when applicable) will be available onsite whenever work is occurring and a copy shall be submitted to the Engineer upon request.

4.3 Sediment Removal and Disposal. Removal of accumulated, settled sediment from behind barriers, traps, or within basins.

- A. Construction Requirements: Accumulated sediment shall be removed when it exceeds the volumes specified for any particular measure or when ordered by the Engineer. Sediments removed shall be mixed with other onsite materials and incorporated into project fills, spread loosely across the site, or hauled offsite as necessary. Sediments may not form an identifiable layer or seam in any fill. Sediments hauled offsite shall be dewatered first or hauled in a water tight truck. Sediments shall be located and compacted in a way which minimizes the likelihood of being re-suspended in future rainfalls. Removal shall be by machine or hand work, whichever is most feasible.
- B. Measurement and Payment: "Sediment Removal" will be measured per cubic yard and paid for at the contract unit price for each. When removals are made necessary due to Contractor's failure to maintain other erosion or sediment controls, including failure to properly maintain or repair damaged measures upstream or failure to install controls in a timely manner, then such sediment removal will not be measured and paid separately but shall be at the Contractor's expense.

4.4 Sediment Fence. A temporary barrier of synthetic fabric embedded in the ground and supported by posts and in some cases wire fencing, used to divert water or to maintain a trap for settlement.

A. Materials:

1. Geotextile Fabric: Shall meet the requirements of AASHTO M 288, which include requirements for elongation, grab strength, permittivity, apparent opening size, and ultraviolet stability. The geotextile supplied shall meet the quality requirements given in AASHTO M 288 for the geotextile specified in plan drawings.
2. Posts: Posts shall be hardwood with a 1 1/2" nominal dimension or shall be steel posts of U, T, L, or C shape, weighing 1.33 lbs per foot minimum. Only steel posts may be used on wire-supported fence. Fence pre-fabricated with posts is not allowed due to difficulty of proper installation.
3. Wire Reinforcement: When used, shall be woven-wire fencing with a minimum wire gage between 9 and 14 and a maximum mesh spacing of 6 inches in all directions.

B. Construction Requirements: Install fence as shown on the Standard Drawing. Installation shall either by standard trench or through the use of a specialized machine capable of inserting the fence securely into the ground with a slicing method and firmly compacting the slice closed. The slicing-machine method is preferred for all locations where the machine can reasonably be used. Sediment fence must be firmly anchored to the ground, well compacted, free of rips and tears, and standing securely upright. Joints in Sediment fence must overlap to prevent leakage. Existing trees shall not be used as stakes, and trenches for Sediment fence shall avoid damaging the root zone of trees to be saved. Provide wire support for fence when specified on the plans or by the Engineer. Wire support is generally used when controlling large areas or to discourage accidental damage by vehicles.

Sediment fence shall be located generally as shown in the plans, but adjusted to conform to the actual contours and based on the usage, as follows:

1. When used to capture overland flow, install along the contour to provide maximum storage volume without overtopping, with ends turning to run up-slope a short distance to prevent bypassing. Additional volume may be created by excavating depressions on the upstream side of the fence.
2. When used for ditch checks, extend the ends up the side slope of ditch sufficiently to prevent bypass around the end posts.
3. When used to divert and direct water, install to create a smoothly descending flow line.
4. When used at the toe of an embankment, offset Sediment fence by several feet to provide Sediment storage capacity.
5. When used as perimeter control of a site or stockpile, loose fill or stockpiled earth shall not be placed or allowed to fall directly against the Sediment fence. Sediment fence shall not support a stockpile.

- C. Maintenance: Remove Sediment deposits when they exceed 1/3 the height of the fence. Replace all broken, ripped, degraded, or damaged sections of fence immediately with new fencing, including adequate overlap at ends to prevent leakage.
- D. Measurement and Payment: Sediment fence will be measured by the linear foot and will be paid for at the contract unit price for either "Sediment Fence" or "Sediment Fence (Reinforced)" as applicable. Initial excavation of depressions on the upstream side of Sediment fence to create added storage will be measured and paid for as "Sediment Removal."

4.5 Rock Barriers. Small temporary stone dams used to form sediment traps or used as ditch checks in ditches with large flows. Barriers may also be used to redirect water when other measures are not sufficient.

- A. Materials: Rock shall be a clean aggregate free of deleterious substances, including earth, chert, cracks, seams, soapstone, shale or other easily disintegrated materials. Rock shall come from a primary run and be screened to remove the easily separated fines. It shall meet the gradation requirements below for the nominal size specified:

2-inch Rock: A majority of the particles larger than 1.5 inches in diameter and none larger than 4 inches. Total aggregate and fines smaller than 1/2 inch shall not exceed 2 % by weight.

4-inch Rock: A majority of the particles larger than 4 inches in diameter and none larger than 9 inches. Total aggregate and fines smaller than 1" shall not exceed 2 % by weight.

6-inch Rock: A majority of the particles larger than 6 inches in diameter and none larger than 12 inches. Total aggregate and fines smaller than 1" shall not exceed 2 % by weight.

The Engineer may approve modifications to these gradations to accommodate readily available stockpiles from local quarries.

- B. Construction Requirements: Rock barriers shall be placed as shown on the plans or Standard Details. When shown, depressions shall be excavated on the upstream side of rock barriers to increase available storage volume and create a sediment trap. All rock shall be removed from the site at the completion of work, unless suitable onsite disposal is authorized by the Engineer.
- C. Maintenance: Remove Sediment when it accumulates 1/2 the height of the barrier. Reshape or replace rock where settlements or isolated breaches occur.
- D. Measurement and Payment: "Rock Barriers (Named Size)" will be measured per ton to one decimal place, as placed, and paid for at the contract unit price for the nominal size indicated. Initial excavation of depressions on the upstream side of rock barriers to create added storage will be measured and paid for as "Sediment Removal."

4.6 Open-Flow Ditch Check. A-frame ditch-checks with an open weave that allows significant flow through while lowering velocities sufficiently to cause settlement.

- A. Materials:
1. Frame: Structure made of strands of high-density polyethylene woven to produce rectangular openings. Frames made of metal or other plastics having equivalent strength and durability may be used. Opening sizes may vary across the frame, with generally smaller openings clustered at the bottom to screen materials and larger openings at the top to facilitate overflow. Openings shall comprise a minimum of 35% of the cross sectional area of the frame. Frames shall be fabricated in triangular "A-frame" shape with a flange at both ends on the bottom to facilitate anchoring into the soil.
  2. Anchors: As recommended by the manufacturer.
  3. Erosion Control Blanket: Shall be Class 2, Type F as specified in Subsection 3.8, unless an alternate type is indicated on the plans.
- B. Construction Requirements: Prepare channel or ditch by forming the shape and grade and compacting the subgrade. Apply any soil additives, fertilizer, seed, or erosion control blankets as required before installing ditch check. Install ditch check and underlying erosion control blanket as shown in the Standard Drawing.
- C. Maintenance: Remove Sediment when it accumulates 1/2 the height of the ditch check. If units are damaged or dislodged during the sediment removal process, repair and re-establish continuity.
- D. Measurement and Payment: "Open-Flow Ditch Check" will be measured per linear foot and paid for at the contract unit price. Underlying erosion control blanket or geo-textiles shall be subsidiary.

4.7 Straw Wattle. Circular tubes of netting filled with straw fibers and used as a small height barrier for diversion of water or settlement.

- A. Materials: Wattles shall consist of a rice or wheat straw fibers as filler within a containment netting. Filler shall be certified as weed free in accordance with state standards. Fibers must have an average length greater than 3 inches. Containment netting shall be high-density polyethylene and ethyl vinyl acetate and shall contain ultraviolet inhibitors. The strand thickness shall be no less than 0.030 inches, the knot thickness no less than 0.055 inches and the netting weight no less than 0.35 ounces per foot. The entire wattle unit shall be sufficiently durable to withstand weather, construction, and installation conditions for no less than 3 months, including multiple movements and reinstallations. Wattles shall have a 9-inch diameter (1-inch tolerance) and a minimum unit weight of 1.4 lbs/ft. Wood or steel posts of sufficient strength withstand installation and weather shall be used for anchoring.
- B. Construction Requirements: Wattles shall be located as shown on the plans or as directed by the Engineer. Individual units shall be installed in accordance with manufacturer's recommendations and the Standard Drawings. Units shall be laid end to end and abutted firmly or overlapped against the next consecutive unit.
- C. Maintenance: Remove Sediment when it accumulates to 1/2 the height of the wattle. Repair torn, ripped, or degraded segments. Avoid driving over wattles and repair any segments damaged by vehicles. Correct shifts in wattle alignment. Repair rills or gullies upslope of the wattle and any undercutting that may occur.

Units that do not satisfy the durability requirement shall be replaced at no extra cost.

- D. Measurement and Payment: "Straw Wattles" will be measured per linear foot and paid for at the contract unit price.

4.8 Foam Dike. Foam strips wrapped in geotextile fabric and used as a small height barrier for diversion of water or settlement.

- A. Materials: Foam dikes shall have an inner material of plastic foam with an outer covering of geotextile fabric fitted snugly. Plastic shall be urethane or other material approved by the Engineer and shall be durable, weather resistant, and flexible. The foam core shall have a triangular or rectangular cross section that is stable when placed, and shall provide for a minimum of 7" height barrier height above grade. Geotextile shall meet the same requirements as given for Sediment fence in this specification. The geotextile shall have flaps that extend a minimum of 3 feet beyond the base of the inner material in each transverse direction. The entire foam dike unit shall be sufficiently durable to withstand weather, construction, and installation conditions for no less than 3 months. The foam dike shall be anchored by staples.
- B. Construction Requirements: Foam dikes units shall be located as shown on the plans or directed by the Engineer. Units shall be installed in accordance with manufacturer's recommendations and the Standard Drawings. Units shall be laid end to end and abutted firmly to the next consecutive unit.
- C. Maintenance: Remove Sediment when it accumulates 1/2 the height of the foam dike. Repair torn, ripped, or degraded segments. Avoid driving over foam dikes and repair any segments damaged by vehicles. Units that do not satisfy the durability requirement shall be replaced at no extra cost.
- D. Measurement and Payment: "Foam Dike" will be measured per linear foot and paid for at the contract unit price.

4.9 Gravel Bags. Small gravel-filled durable bags that are placed, stacked, or piled to form temporary diversions, barriers, or ditch checks.

- A. Materials: Bags shall be woven polypropylene, polyethylene, or polyamide fabric or burlap having a minimum unit weight of 4 ounces per square yard. The Mullen burst strength shall exceed 300 psi per ASTM D3786 and shall have ultraviolet stability exceeding 70% per ASTM D4355. Bags shall be filled with clean, coarse aggregate from 1/2" to 1" diameter and securely sealed. Bags may be of any size suitable for hand placement and carrying. A typical bag size is 18-inches long, 12-inches wide, and 3-inches thick with a weight of 30-35 pounds when loosely filled.
- B. Construction Requirements: Bags shall be placed tightly together with no gaps between individual bags or adjacent curbs, walls or other surfaces against which they are placed.
- C. Maintenance: Sediment that is stopped by and stored behind the bag shall be removed after every rainfall.
- D. Measurement and Payment: "Gravel Bags" will be measured by the pound and paid for at the contract unit price. The Contractor shall provide the Engineer with

an average weight per bag of each size and type used on the project and the Engineer may verify weights. Actual measurement in the field shall be based on number of bags placed multiplied by the average weight. Relocation of bags during the progress of the work shall be subsidiary.

4.10 Temporary Diversion. Earthen berm and adjacent swale temporarily graded and compacted to provide a diversion or to trap small areas of overland flow. Temporary Diversions can be used in conjunction with slope drains at the top of slopes to prevent sheet flow down the slope.

- A. **Materials:** Temporary diversions shall consist of any soil material from within the project limits that is capable of being compacted.
- B. **Construction Requirements:** Temporary diversions shall be constructed to the dimensions shown in the Standard Drawings. The diversion shall be wheel compacted with one pass minimum over the entire width of the berm. Material for the berm should be drawn from the swale (or diversion channel) excavated adjacent to the berm on the upslope side, so as to further establish the drainageway.
- C. **Maintenance:** Diversions shall be re-shaped and re-compacted as necessary to maintain their function. Breaches in the berm shall be repaired promptly.
- D. **Measurement and Payment:** "Temporary Diversion" will be measured per linear foot and paid for at the contract unit price. Such payment shall be full compensation for berm installation, maintenance, removal and other work noted on the plans.

4.11 Temporary Slope Drain. A flexible tubing or conduit used to convey concentrated water from the top of a slope down to the toe and thereby preventing erosion over the slope face.

- A. **Materials:** Temporary slope drains shall be metal, plastic, or flexible rubber pipe having a minimum 12 inch diameter. Pipe walls shall be impermeable and not slotted. Preformed elbows will be provided where sharp grade changes are needed. Standard flared end sections as approved by the Engineer shall be provided at both the inlet and outlet. Rock for energy dissipation at the outlet shall meet the material requirements for "Rock Barrier".
- B. **Construction Requirements:** Temporary slope drains shall be constructed as shown in the Standard Details. Water shall be directed towards the inlets by the use of temporary berms, Sediment fence, gravel bags, or other barrier systems shown on the plans or approved by the Engineer. The drain will discharge onto a stabilized feature to prevent scour.
- C. **Maintenance:** Sediment ponded at the inlet that would disrupt smooth flow shall be removed promptly. Outlet conditions shall be repaired if scour is observed. Leaking or damaged sections of pipe shall be repaired immediately. Berms or fences directing water to the inlet shall be monitored for continuity and effectiveness and repaired or modified appropriately.
- D. **Measurement and Payment:** "Temporary Slope Drain" will be measured per linear foot and paid for at the contract unit price. Necessary outlet protection is subsidiary.

4.12 Inlet Protection. Any one of a variety of devices or procedures used to allow water to enter a stormwater inlet while filtering or temporarily impeding the flow sufficiently to reduce the quantity of sediment entering the inlet.

- A. **Materials:** When used, wattles, foam dike, Sediment fence, rock ditch checks and gravel bags shall meet the material requirements in the respective Subsection of this specification. All other material specifications are as shown in the Standard Details or on the plans.
- B. **Construction Requirements:** Unless otherwise indicated by the Engineer, any of the inlet protection systems given in the Standard Details or plans may be used where appropriate. The project plans may limit the use of particular inlet treatments or specify greater detail on their use. The appropriate details for a given inlet will change during the progress of the job and adjustments shall be made as inlet construction progresses. Each inlet shall be protected continuously from initial construction until final stabilization.

When surrounding conditions are such that protection of an inlet would lead to an increased risk of flooding adjacent structures or streets, the barriers shall be adjusted or eliminated to avoid such impacts. In those cases, the amount of sediment that enters the inlet shall be minimized using other protection methods, such as temporary seeding or mulch cover.

The general cases of inlet protection and the performance expected from each are as follows:

- 1. **All Inlets at Sump Conditions:** Inlets at sump conditions must remain accessible for flow at all times. Small barriers, depressions and/or filters are used to screen larger sediments and initiate settlement of the water prior to it entering the inlet by creating a ponding zone. Generally, stormwater will enter the inlet via weir flow over the top of the barrier. Such water is generally the least-sediment laden as it is decanted from the top of the ponded area.
  - 2. **Street Inlets on Grade:** On-grade inlets must be converted into localized sump condition by installing a barrier downstream and around the inlet, with sufficient height to produce ponding, while a barrier, depression, and/or filter in front of the inlet induces settlement of solids. Bypassing of water at the on-grade inlet shall not be allowed and the inlet must remain open to accept flow without causing excessive flooding.
  - 3. **Selected Inlets Closed to Flow:** In select locations, inlets may be designated on the plans as "closed to flow." In those situations, the objective is to provide sufficient blockage of permanent and temporary openings to prevent entry of stormwater into the inlet. Such locations will be clearly indicated on the plans, and the closed condition for flow may be designated for only a portion of the construction period. The Contractor shall notify the Engineer if they believe that the closure of such inlets would result in an increased risk of flooding or downstream erosion, and such concerns shall be resolved before closing an inlet to flow.
- C. **Maintenance:** Sediment will be removed from each inlet after every rainfall event that exceeds 1/2" or which results in a visible accumulation of sediment. Particular attention will be paid to prevent blockage of inlets or cases where re-suspension of captured sediment is likely. Specific maintenance issues unique

to each inlet protection type shall be as outlined in the appropriate Standard Drawing or Subsection of this specification.

- D. Measurement and Payment: "Inlet Protection" will be measured per each inlet protected and paid for at the contract unit price. Each inlet will be measured only one time for the duration of the project regardless of the number of phases or protection methods used to protect a single inlet. Unless otherwise specified in the plans or contract documents, inlet protection at all locations will be paid at the same unit price.

4.13 Stabilized Stone Pad. A stabilized layer of large aggregate located in areas of high traffic and at the construction entrance, intended to prevent mud and Sediment from becoming embedded in tires or tracked offsite and to protect the site from rutting.

- A. Materials: Stone shall meet the requirements for 4-inch rock used in rock barriers, as specified in Subsection 4.5.
- B. Construction Requirements: Stabilized stone pads for temporary construction entrances or other uses shall be constructed where shown on the plans or directed by the Engineer. Contractor will avoid locating entrances on steep slopes or at curves on public roads. Where possible, entrances and pads will be located where permanent roads will eventually be constructed. All existing vegetation and other unsuitable material shall be removed from the foundation area. The area shall be graded and crowned for positive drainage. The existing subgrade shall be compacted by three passes of heavy vehicles. The stone shall be placed and compacted by another three passes of heavy vehicles. Surface drainage runoff shall be diverted from the stone pad to a sediment trap formed by rock barrier, as described in Subsection 4.5.
- C. Maintenance: Reshape pad as needed for drainage and runoff control. Top dress with clean stone as needed.
- D. Measurement and Payment: "Stabilized Stone Pad" will be measured by the ton to one decimal place, of stone placed and paid for at the contract unit price.

4.14 Temporary Sediment Basin. A temporary reservoir, embankment and outlet works constructed across a drainageway to intercept sediment-laden runoff from large areas (generally in excess of 5 acres) and provide retention time sufficient to settle out a majority of solids. Sediment Basins shall be designed by a Professional Engineer in Kansas and shall satisfy all applicable local, state and federal rules and regulations.

The embankment, reservoir, spillway and appurtenances shall be constructed as shown on plans drawings prepared by the Professional Engineer and as approved by the City of Newton.

Care shall be taken to ensure that the stream crossing does not cause flooding of adjacent homes, buildings, or other structures.

- A. Materials: Materials used in the sediment basin shall conform to the requirements given in the plans drawings.
- B. Construction Requirements: All clearing, grubbing, demolition, excavation,

embankment, compaction, or other grading necessary to construct the sediment basin shall be done in accordance with Sections 02001, 02100 and 02200, and the plan drawings.

Where the plans indicate that a temporary sediment basin is to be converted into a permanent basin, pond, or other stormwater facility, the construction, use, and removal or alterations shall be coordinated to result in the final facility with minimal disruption to the sitework, downstream channel, or future facility.

The construction of the sediment basin shall be carried out in a manner that does not create sediment problems downstream. The embankment and emergency spillway shall be stabilized with temporary or permanent vegetation immediately after installation of the basin.

Construction warning fence and signs shall be installed around the perimeter of the pond. Additional fencing shall be installed as indicated on the plans.

- C. Maintenance: Check temporary sediment basins after periods of significant runoff. Remove sediment and restore the basin to its original dimensions when sediment accumulates to one-half the design depth. Check the embankment, spillways, and outlet for erosion damage, and inspect the embankment for piping and settlement. Make all necessary repairs immediately. Remove all trash and other debris from the riser and pool area.
- D. Measurement and Payment: "Temporary Sediment Basin" shall be lump sum, and no measurement for payment of any item will be made. If multiple basins are used on a project, then this item shall be lump sum for all basins collectively, unless the bidding list designates individual locations.

Eighty percent (80%) of the lump sum payment shall be made once the basin is complete, in-place and operational. The final twenty percent (20%) shall be made when the basin is removed. Such payment shall be full compensation for clearing, grubbing, grading, spillway installation, stabilization, maintenance, removal, and any other work noted on the plans, including installation of outlet protection. Routine removal of sediment will be measured and paid for as "Sediment Removal."

If the basin indicated on the plans is to be converted at the end of construction into a permanent pond, basin, or other stormwater facility, then this item shall include payment only for the incremental costs associated with its use as a temporary basin. Permanent embankments, excavations, spillways, or other appurtenances that are constructed will be handled by the other appropriate items of the Contract for the permanent facility.

**4.15 Temporary Stream Crossing.** A temporary culvert or bridge crossing for construction access or a utility crossing constructed in a creek, river, or stream.

- A. Materials: Materials used in the stream crossing shall conform to the requirements given herein and in the Standard Drawing.
- B. Construction Requirements: All clearing, grubbing, demolition, excavation, embankment, compaction, or other grading necessary to construct the stream crossing shall be done in accordance with Sections 02001, 02100 and 02200, and the Standard Drawings, unless more stringent requirements are provided for in the project plans or specifications.

The culvert, backfill, haul road, approaches, and appurtenances shall be constructed as shown on the plans and in the Standard Drawing. Culvert sizing, number, and orientation shall be as indicated in the plans. Care shall be taken to ensure that the stream crossing does not cause flooding of adjacent homes, buildings, or other structures. Concerns about adequacy of culvert sizing should be brought to the immediate attention of the Engineer and no installation made until such concerns are resolved.

The temporary stream crossing shall be at right angles to the stream. Where approach conditions dictate, the crossing may vary 15 degrees from perpendicular.

The centerline of both roadway approaches shall coincide with the crossing alignment centerline for a minimum distance of 50 feet from each bank of the stream being crossed. If physical or right-of-way restraints preclude the 50-foot minimum, a shorter distance may be provided. All fill materials associated with the roadway approach shall be limited to a maximum height of 2 feet above the existing floodplain elevation.

A diversion shall be constructed across the roadway on both roadway approaches a maximum of 50 feet on either side of the top of the stream bank, to prevent roadway surface runoff from directly entering the stream. Design criteria for this diverting structure shall be in accordance with Subsection 4.10, Temporary Diversions. If the roadway approach is constructed with a reverse grade away from the stream, a separate diverting structure is not required.

#### 1) Temporary Culvert Crossing

- a) Where culverts are installed, 3 to 6-inch coarse aggregate or larger will be used to form the crossing. The depth of stone cover over the culvert shall be equal to one-half the diameter of the culvert or 12 inches, whichever is greater.
- b) If the structure will remain in place for up to 14 days, the culvert shall be large enough to convey the flow from a 2-year storm without appreciably altering the stream flow characteristics. If the structure will remain in place 14 days to 1 year, the culvert shall be large enough to convey the flow from a 10-year storm. In this case, the hydrologic calculation and subsequent culvert size must be determined for the specific watershed characteristics. If the crossing must remain in place over 1 year, it must be designed as a permanent structure by a qualified professional.
- c) Multiple culverts may be used in place of one large culvert if they have equivalent capacity. The minimum-sized culvert that may be used is 18 inches.
- d) All culverts shall be strong enough to support their cross sectioned area under maximum expected loads.
- e) The length of the culvert shall be adequate to extend the full width of the crossing, including side slopes. The slope of the culvert shall be at least 0.25 inch per foot.

- f) The approaches to the structure shall consist of pads constructed of 3 to 6-inch stone that are a minimum of 6 inches thick and at least as wide as the structure:
- g) See Standard Drawing ESC-1060 for additional details.

2) Temporary Bridge Crossing

- a) Structures may be designed in various configurations. However, the materials used to construct the bridge must be able to withstand the anticipated loading of the construction traffic.
- b) Appropriate perimeter controls such as sediment fence or turbidity curtains must be employed when necessary along banks of stream parallel to the same.
- c) All crossings shall have one traffic lane. The minimum width shall be 12 feet with a maximum width of 20 feet.

- C. Maintenance: Check temporary stream crossings after periods of significant runoff. Remove blockages to the inlet section and repair any scoured or damaged sections. If a temporary crossing requires excessive maintenance, replacement with a larger culvert or alternate design may be necessary.
- D. Measurement and Payment: "Temporary Stream Crossing" shall be lump sum and no measurement for payment of any item will be made. If multiple crossings are used on a project, then this item shall be lump sum for all crossings collectively, unless the bidding list designates locations individually.

Eighty percent (80%) of the lump sum payment shall be made once the crossing is complete, in-place and operational. The final twenty percent (20%) shall be made when the crossing is removed.

4.16 Turbidity Curtains. Floating barriers of synthetic fabric curtain suspended in the water and held in a vertical position, used in lakes and perennial rivers to slow, contain or direct the flow from disturbed areas allowing solids to settle out before spreading into the surrounding water.

- A. Materials: All components shall conform to the requirements given for the specific turbidity curtain system specified in the plans.
- B. Construction Requirements: Shall conform to the manufacturer's recommendations for the curtain system specified in the plans and additional requirements as may be listed in the plans. A manufacturer's representative shall be onsite during installation of the system.
- C. Maintenance: Anchor lines shall be kept secure and properly positioned. Fabric, cable, and other appurtenances shall be repaired immediately as needed and in accordance with manufacturer's instructions.
- D. Measurement and Payment: "Turbidity Curtain" will be measured by the linear foot and paid for at the contract unit price.

## 5. MEASUREMENTS AND PAYMENTS

5.1 Summary. This Subsection includes the method of measurement and the basis of payment, for furnishing all labor, equipment, tools and materials and for the performance of all related work necessary to complete any work covered in this Section 02490.

5.2 General. Unless specifically altered by Contract Special Provisions, the methods of measurement and payment shall be as specified in each Subsection herein, and as listed in the Proposal.

5.3 Measurement. The work shall be measured for payment as specified in each applicable Subsection and verified by the Engineer. The method of measurement and computations used in determination of quantities of work performed will be those methods generally recognized as conforming to good engineering practice.

5.4 Items not listed in the Proposal. There shall be no measurement or separate payment for any item of work not specifically identified and listed in the Proposal. All costs pertaining thereto shall be included in the cost of the other items included in the Proposal.

5.5 Measurement and Payment Summary Table.

<b>Item Description</b>	<b>Ref. Section</b>	<b>Method of Measurement</b>	<b>Basis of Payment</b>
General Requirements	1	No measurement	Subsidiary to other items
Chemical and Waste Controls	2	No measurement	Subsidiary to other items
Permanent Seeding or Sodding	3.3	0.01 acre	Unit Bid Price
Out of Season Watering	3.3	1,000 gallon unit	Unit Bid Price
Temporary Seeding	3.4	0.01 acre	Unit Bid Price
Mulch Cover	3.5	0.01 acre	Unit Bid Price
Hydrocover (Standard)	3.6	1 lbs dry-weight of fiber	Unit Bid Price
Hydrocover (Named Specialty Mix)	3.7	1 lbs dry-weight of fiber	Unit Bid Price
Erosion Control Blanket (Named Type)	3.8	1 sq. yd. of sloped area	Unit Bid Price
Surface Roughening	3.9	No measurement	Subsidiary to other items
Dust Control	3.10	No measurement	Subsidiary to other items
Sediment Removal	4.3	1 cu. yd.	Unit Bid Price
Sediment Fence	4.4	1 lin. ft.	Unit Bid Price
Sediment Fence (Reinforced)	4.4	1 lin. ft.	Unit Bid Price
Rock Barrier (Named Size)	4.5	0.1 ton	Unit Bid Price
Open-Flow Ditch Check	4.6	1 lin. ft.	Unit Bid Price
Straw Wattle	4.7	1 lin. ft.	Unit Bid Price
Foam Dike	4.8	1 lin. ft.	Unit Bid Price
Gravel Bags	4.9	1 lbs.	Unit Bid Price
Temporary Diversion	4.10	1 lin. ft.	Unit Bid Price
Temporary Slope Drain	4.11	1 lin. ft.	Unit Bid Price
Inlet Protection	4.12	Each inlet	Unit Bid Price
Stabilized Stone Pad	4.13	0.1 ton	Unit Bid Price
Temporary Sediment Basin	4.14	No measurement	Lump Sum
Temporary Stream Crossing	4.15	No measurement	Lump Sum
Turbidity Curtain	4.16	1 lin. ft.	Unit Bid Price