SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

This section specifies various erosion and sedimentation control devices that may function in any particular combination as an erosion control system for transportation and site development applications. Use this section in conjunction with other site construction sections or modify this section to provide those referenced requirements here.

This section includes performance, proprietary, and descriptive type specifications. Edit to avoid conflicting requirements.

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section Includes:

Temporary Structural Measures

Permanent Structural Measures

Vegetative Measures

Biotechnical measures

Diversion Channels.

Rock Energy Dissipator.

Paved Energy Dissipator.

Rock Basin.

Rock Barriers.

Sediment Basins.

Sediment Traps.

* + - 1. REFERENCES

List reference standards included within text of this section. Edit the following for project conditions.

* + - * 1. New York State Standards and Specifications for Erosion and Sediment Control, current version as published by the New York State Department of Environmental Conservation.
				2. New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity, current version, as published by the New York State Department of Environmental Conservation.

If required, the SWPPP should be included as an attachment to the project manual for the responsible Contractor.

* + - * 1. Stormwater Pollution Prevention Plan (SWPPP) entitled [Name], dated [date] [latest revision], as prepared by [Preparing Entity].
				2. ASTM International:

ASTM C127 - Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.

ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).

ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).

ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

* + - 1. SUBMITTALS
				1. Submittals for this Section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Trained Contractor Documentation:

Name and Title of individual from each contractor or subcontractor performing land disturbance, who will be known as the Trained Contractor and responsible for implementation of the SWPPP.

For each Trained Contractor, submit copy of completion certificate or card for NYS Department of Environmental Conservation endorsed Erosion & Sediment Control training.

Only request submittals needed to verify compliance with project requirements.

* + - * 1. Product Data: Submit data on temporary and permanent erosion and sediment control measures.
				2. Submit proposed mix design [**of each class of concrete**] for review prior to commencement of Work.

Include the following paragraph to submit physical samples to select finish, color, texture, and other properties.

* + - * 1. Samples:

Submit two samples or rock, minimum 5 tons each or one-half total Project quantity, whichever is smaller. Provide one sample in place at construction site and provide other sample at quarry. Construction site sample may be incorporated into the Work. Samples will be used as reference for judging size, and graduation of rock supplied and placed.

* + - * 1. Test Reports: Indicate certified tests results for precast concrete at manufacturing facility, cast-in-place concrete in field, and granular backfill.
				2. Manufacturer's Certificate: Certify [**Products**] meet or exceed [**specified requirements**].
			1. QUALITY ASSURANCE

Use this article to specify compliance with overall reference standards affecting all products and installation included in this section.

* + - * 1. Perform Work according to NEW YORK STATE STANDARDS AND SEPCIFICATIONS FOR EROSION AND SEDIMENT CONTROL by NYS Department of Environmental Conservation (i.e., Bluebook) standards.
			1. PRE-INSTALLATION MEETING
				1. Section 013000 - Administrative Requirements: Pre-installation meeting.
				2. Convene minimum [**one**] week prior to commencing Work of this Section.
			2. ENVIRONMENTAL REQUIREMENTS
				1. Do not place grout when air temperature is below freezing.
				2. Do not place concrete when base surface temperature is less than [40 degrees F], or surface is wet or frozen.
			3. RESPONSIBILITY
				1. Adhere to all erosion and sediment control requirements presented in the contract Drawings and outlined in the SWPPP. Comply with all applicable NYSDEC regulatory requirements.
				2. A SWPPP has been prepared for this project. Prior to commencing any land disturbance (i.e. clearing, grading, excavation, etc.), install the temporary erosion and sediment control measures as shown on the drawings, outlined in the SWPPP, and/or as directed by the Director’s Representative. Maintain all temporary erosion and sediment control measures in compliance with SPDES permit regulations for the duration of construction. Adjust temporary measures as needed to prevent erosion and sediment transport beyond the contract limit line. Place required permanent control practices prior to removal of temporary stormwater diversion, or erosion and sediment control measures.
				3. The Trained Contractor(s) shall inspect erosion and sediment controls on a daily basis to ensure that they are being maintained in effective operating condition at all times. If deficiencies are identified, begin implementing corrective actions within one business day and complete the corrective actions in a reasonable time frame.

For construction activities where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the trained contractor can stop conducting maintenance inspections. The trained contractor shall recommence maintenance inspections as soon as soil disturbance activities resume or winter shutdown ceases.

For winter shutdown, the stabilization activities must be completed before snow cover or frozen ground. If vegetation is required, seeding, planting and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment. Trained contractor inspections must resume no later than April 1.

For construction sites where soil disturbance activities have been shut down with partial project completion, the trained contractor can stop conducting maintenance inspections if all areas disturbed as of the project shutdown date have achieved final stabilization and all post-construction stormwater management practice required (if applicable) for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

* + - * 1. A qualified inspector will be obtained by the Director’s Representative to perform SWPPP Inspections, at the frequency specified in the project SWPPP. If deficiencies are identified, begin implementing corrective actions within one business day of notification and complete the corrective actions in a reasonable time frame.
				2. During construction conduct operations to prevent damage to any water body from pollution by debris, sediment, chemical or other foreign material, or from the manipulation of equipment and/or materials in or near a stream or ditch flowing directly to a stream. Any water which has been used for wash purposes or other similar operations that becomes polluted with sewage, silt, cement, concentrated chlorine, oil, fuels, lubricants, bitumens, or other impurities shall not be discharged into any water body.
				3. In the event of conflict between these specifications and the regulation of other Federal, State, or local jurisdictions, the more restrictive regulations shall apply.
			1. DESCRIPTION
				1. The Work shall consist of furnishing, installing, inspecting, maintaining, and removing erosion and sediment control measures as shown on the contract documents or as ordered by the Director’s Representative during the life of the contract to provide erosion and sediment control.

The following 4 paragraphs include all erosion and sediment control practices listed in the Notice of Intent (NOI). Delete as required for consistency with items checked in the NOI.

* + - * 1. Temporary structural measures provide erosion control protection to a critical area for an interim period. A critical area is any disturbed, bare slope subject to erosion. These are used during construction to prevent off-site sedimentation. Temporary structural measures shall include:

Check dams

Construction road stabilization

Stabilized construction access

Dust control

Earth dike

Flow spreader

Perimeter dike/swale

Pipe slope drain

Portable sediment tank

Rock dam

Sediment basin

Sediment trap

Silt fence

Erosion control matting

Storm drain inlet protection

Straw/hay bale dike

Temporary access waterway crossing

Temporary storm drain diversion

Temporary swale

Turbidity curtain

Water bars

Other temporary structural measures as required by the SWPPP.

* + - * 1. Permanent structural measures also control protection to a critical area. They are used to convey runoff to a safe outlet. They remain in place and continue to function after completion of construction. Permanent structural measures shall include:

Debris basin

Diversion

Grade stabilization structure

Land grading

Erosion control blanket

Lined waterway (rock)

Paved channel

Paved flume

Retaining wall

Riprap

Rock outlet protection

Streambank protection

Other permanent structural measures as required by the SWPPP.

* + - * 1. Vegetative measures shall include:

Brush matting

Dune stabilization

Grassed waterway

Mulching

Protecting vegetation

Seeding

Sodding

Straw/hay bale dike

Stream bank protection

Temporary swale

Topsoil

Vegetating waterways

Other vegetative measures as required by the SWPPP.

* + - * 1. Biotechnical measures shall include:

Live fascines

Brush matting

Brush layering

Live crib wall

Branch packing

Vegetated rock gabions

Live staking

Tree revetment

Fiber rolls

Other biotechnical measures as required by the SWPPP.

1. PRODUCTS
	* + 1. ROCK AND GEOTEXTILE MATERIALS
				1. Rock: As specified in Section [310001 Earthwork Materials].

 \*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Rock: [**Granite**] [**Limestone**] <**\_\_\_\_\_\_\_\_**> type; [**broken stone**] [**irregular shaped rock**] <**\_\_\_\_\_\_\_\_**>; solid and nonfriable; <\_\_\_\_\_\_\_\_> inch minimum size, <\_\_\_\_\_\_\_\_> inch maximum size.
				2. Geotextile Fabric: As specified in Section 310001 Earthwork Materials.
			1. CONCRETE MATERIALS AND REINFORCEMENT
				1. Concrete Mix: <\_\_\_\_\_> psi, as specified in [033000] [033001] Cast-In-Place Concrete.
				2. Reinforcement Steel: [Grade] <\_\_\_\_\_\_\_\_>, [deformed] [plain] bars, [galvanized] [epoxy coated], as specified in Section [033001 Cast-In-Place Concrete ] [032100 Steel Concrete Reinforcement].
				3. Welded Steel Wire Fabric: [**Deformed Type**], [**flat sheets**] [**coiled rolls**], [**unfinished**] [**galvanized**] [**epoxy coated, Class A finish**], as specified in Section **[033001 Cast-In-Place Concrete ] [032100 Steel Concrete Reinforcement].**
			2. BLOCK, STONE, AGGREGATE, AND SOIL MATERIALS
				1. Precast Solid Concrete Block: <\_\_\_\_\_\_\_\_> psi, as specified in Section 042200 Concrete Unit Masonry.
				2. Stone: <\_\_\_\_\_\_\_\_>, as specified in Section [310001 Earthwork Materials].
				3. Coarse Aggregate: <\_\_\_\_\_\_\_\_>, as specified in Section [310001 Earthwork Materials].
				4. Soil Backfill: <\_\_\_\_\_\_\_\_>, as specified in Section [**310001 Earthwork Materials**]. [**Subsurface soil with no rocks over 6 inches in diameter, frozen earth or foreign matter.**]
			3. PLANTING MATERIALS
				1. Soil Supplements: <\_\_\_\_\_\_\_\_>, as specified in Section 329200 Turf and Grasses.
				2. Seeding: Temporary or permanent, as specified in Section 329200 Turf and Grasses.
				3. Mulch: <\_\_\_\_\_\_\_\_>, as specified in Section [329200] [329300] <\_\_\_\_\_\_\_\_>.
				4. Plant Materials for biotechnical slope protection: Locate stands of specified species and obtain approval to harvest material from these stands or obtain from managed production beds that are maintained for commercial distribution. Install all plant materials within 8 hours of cutting or provide proper storage.

Shrub willows: “Streamco” purpleosier willow, and “Bankers” dwarf willow.

Redosier Dogwood

* + - 1. PIPE MATERIALS
				1. Pipe: [Corrugated steel] [Concrete] [Plastic], as specified in Section 334200 Stormwater Conveyance.
			2. ACCESSORIES
				1. Joint Sealers: <\_\_\_\_\_\_\_\_>, as specified in Section 321373 Concrete Paving Joint Sealants.
				2. Joint Filler: <\_\_\_\_\_\_\_\_>, as specified in Section 321373 Concrete Paving Joint Sealants.
				3. Grout: <\_\_\_\_\_\_\_\_>, as specified in <\_\_\_\_\_\_\_\_>.
				4. Welding Material: <\_\_\_\_\_\_\_\_>, as specified in <\_\_\_\_\_\_\_\_>.
				5. Anti-Seep Collar: [Sheet Metal], as specified in <\_\_\_\_\_\_\_\_>.
				6. Trash Rack: [**Bars welded to angles and at each intersection of bars**] <**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**>, as specified <**\_\_\_\_\_\_\_\_**>.
1. EXECUTION
	* + 1. EXAMINATION
				1. Verify compacted [subgrade] [granular base] [stabilized soil] <\_\_\_\_\_\_\_\_> is acceptable and ready to support devices and imposed loads.
				2. Verify gradients and elevations of base or foundation for other Work are correct.
			2. DIVERSION CHANNELS

The construction in this Article is for a vegetated channel at the indicated locations, to divert surface run-off and avoid excessive concentrated sheet flow.

* + - * 1. Excavate and place excavated material on low side of channel.
				2. Compact to 95 percent maximum density.
				3. On entire channel area, apply soil supplements and sow seed as specified in Section 329200 Turf and Grasses and Section 329300 Plants.
				4. Mulch seeded areas with hay as specified in Section 329200 Turf and Grasses and Section 329300 Plants.
			1. ROCK ENERGY DISSIPATOR

The construction in this Article is for rock-lined retention area over geotextile fabric and prepared base with piped inflow, and outflow by rock-lined transition to an existing channel with dimensions and rock depth as indicated.

* + - * 1. Excavate to indicated depth of rock lining. Remove loose, unsuitable material below bottom of rock lining, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.
				2. Lay and overlay geotextile fabric over substrate. Lay fabric parallel to flow from upstream to downstream. Overlap edges upstream over downstream and upslope over downslope Provide a minimum overlap of [3] feet. Offset adjacent roll ends a minimum of [5] feet when lapped. Cover fabric as soon as possible and in no case leave fabric exposed more than 4 weeks.
				3. Carefully place rock on geotextile fabric to produce an even distribution of pieces, with minimum of voids and without tearing geotextile.
				4. Unless indicated otherwise, place full course thickness in one operation to prevent segregation and to avoid displacement of underlying material. Arrange individual rocks for uniform distribution.

Use the following paragraphs when standing water is to be limited or inflow velocities do not require fully open-faced rock lining.

Saturate rock with water. Fill voids between pieces with grout, for at least top 6 inches. Sweep surface with stiff broom to remove excess grout.

Moist cure grouted rock for at least 3 days after grouting, using water saturated burlap in accordance with Section 033000.

* + - 1. PAVED ENERGY DISSIPATOR

The construction in this Article is for paved channel on prepared base with embedded stones or blocks and slope length, channel bottom width, channel length, and paving depth as indicated.

* + - * 1. Excavate to required paving depth. Remove loose, unsuitable material below bottom of paving, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.
				2. Place forms and reinforcement in accordance with Section 321313 Concrete Paving. Hold reinforcement firmly in position during placing of concrete.
				3. Mix, place, finish, and cure concrete, as specified in Section 321313 Concrete Paving.
				4. Embed stones or blocks [3] inches in plastic concrete at indicated separation on slopes and channel bottom.
				5. Pave in uniform **[10]** foot lengths or sections.
				6. Pave in shorter sections as necessary for closures or curves.
				7. Place premolded expansion joint filler, 1/2 inch thick, cut to conform to paving cross sections, at ends of curved sections at intervals of not more than 100 feet, at end of day’s Work, and where paving is adjacent to rigid structure. Use joint filler with depth of 1/2 inch less than paving depth and press firmly against adjacent concrete.
				8. Form intermediate joints between sections, with two thicknesses of bituminous paper cut neatly to paving cross section.
				9. Seal joint top with joint sealer.
			1. ROCK BASIN

The construction in this Article is for rock-lined basin over geotextile material on a prepared base with piped inflow and open outflow to original ground to the indicated dimensions and rock depth.

* + - * 1. Construct generally in accordance with rock energy dissipator requirements to indicated shape and depth. Rock courses may be placed in several operations, but minimum depth of initial course must be **[3]** feet or greater.
			1. ROCK BARRIER

The construction in this Article is a basic rock barrier between channel banks with rock core and upstream coarse aggregate filter blanket to indicated dimensions.

* + - * 1. Determine length required for ditch or depression slope and excavate, compact and foundation area to firm, even surface.
				2. Produce an even distribution of rock pieces, with minimum voids to the indicated shape, height and slope.
				3. Construct coarse aggregate filter blanket against upstream face of rock barrier to the indicated thickness.
			1. SEDIMENTATION BASIN

The Work in this Article includes a dam on prepared base including inlet riser pipe, anti-seep collar, key trench, outlet pipe and rock basin, and provisions for emergency spillway, all to indicated dimensions at indicated location.

* + - * 1. Clear and grub storage area and embankment foundation area as specified in Section 310000 Earthwork.
				2. Excavate key trench for full length of dam. Excavate emergency spillway in natural ground.
				3. Install pipe spillway, with anti-seep collar attached, at location indicated.
				4. Place forms, and reinforcing for concrete footing at bottom of riser pipe [with trash rack and anti-vortex device], as specified in Section 031000, and Section 032000. Construction of embankment and trench prior to placing pipe is not required.
				5. Mix, place, finish, and cure concrete, as specified in Section 033000.
				6. Do not use coarse aggregate as backfill material around pipe. Backfill pipe with suitable embankment material to prevent dam leakage along pipe.
				7. Construct rock basin at outlet end of pipe, as specified in this Section. Place embankment material, as specified in Section 310000 Earthwork. When required, obtain borrow excavation for formation of embankment, as specified in Section 310001 Earthwork Materials.
				8. On entire sedimentation basin area, apply soil supplements and sow seed as specified in Section 329200 Turf and Grasses and Section 329300 Plants.
				9. Mulch seeded areas with hay as specified in Section 329200 Turf and Grasses and Section 329300 Plants.
			1. SEDIMENT TRAP

The construction in this Article is a basic sediment trap of indicated dimensions including large coarse aggregate or rock dam with an upslope lesser-size coarse aggregate filter blanket, and geotextile material at the upslope juncture of dam and finished ground.

* + - * 1. Clear site as specified in Section 310000 Earthwork.
				2. Construct trap by excavating and forming embankments as specified in Section 310000 Earthwork.
				3. Place coarse aggregate or rock at outlet as indicated on Drawings.
				4. Place geotextile fabric, as specified for rock energy dissipator.
				5. When required, obtain borrow excavation for formation of embankment.
				6. On entire sediment trap area, apply soil supplements and sow seed, as specified in Section 329200 Turf and Grasses and Section 329300 Plants.
				7. Mulch seeded areas with hay as specified in Section 329200 Turf and Grasses and Section 329300 Plants.
			1. SITE STABILIZATION
				1. Incorporate erosion control devices indicated on the Drawings ,and in the SWPPP, into the Project at the earliest practicable time.
				2. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.
				3. Stockpile and waste pile heights shall not exceed 35 feet. Slope stockpile sides at 2: 1 or flatter.
				4. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.

During non-germinating periods, apply mulch at recommended rates.

Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 329200 Turf and Grasses and Section 329300 Plants at <\_\_\_\_\_\_\_\_> percent of permanent application rate with no topsoil.

Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 329200 Turf and Grasses and Section 329300 Plants permanent seeding specifications.

* + - * 1. Stabilize diversion channels, sediment traps, and stockpiles immediately.
			1. FIELD QUALITY CONTROL
				1. Field inspecting, testing, adjusting, and balancing.
				2. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.
				3. Field test concrete in accordance with Section [033000].
				4. Compaction Testing: As specified in Section [**310000**].

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Select compaction test method appropriate to fill materials being used and Project requirements.

AASHTO T180, in paragraph below, is very similar to ASTM D1557.

* + - * 1. Compaction Testing: In accordance with [**ASTM D1557**] [**ASTM D698**] [**AASHTO T180**] [**ASTM D2922**] [**ASTM D3017**].
				2. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

Specify frequency of testing when performed by Contractor.

* + - * 1. Frequency of Compaction Testing: [**One**] [**Two**] for each lift.
			1. CLEANING
				1. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.
				2. Do not damage structure or device during cleaning operations.
				3. Do not permit sediment to erode into construction or site areas or natural waterways.
				4. Clean channels when depth of sediment reaches approximately one-half channel depth.
			2. PROTECTION
				1. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
				2. Do not permit construction traffic over paving for [7] [days minimum after finishing.] until [75] [percent design strength of concrete has been achieved.]
				3. Protect paving from elements, flowing water, or other disturbance until curing is completed.
			3. WORK AREAS

Include schedule when several types of devices are required in different locations.

Consider the following partial example when developing Project schedules.

* + - * 1. The Director’s Representative has the authority to limit the surface area of erodible earth exposed by earthwork operations and to direct the Contractor to provide immediate temporary or permanent erosion measures to minimize damage to property and contamination of watercourses and water impoundments. Under no circumstances will the area of erodible earth material exposed at one time exceed 50,000 sq. ft. The Director’s Representative may increase or decrease this area of erodible earth material exposed at one time as determined by their analysis of project, weather and other conditions. The Director’s Representative may limit the area of clearing and grubbing and earthwork operations in progress commensurate with the Contractor’s demonstrated capability in protecting erodible earth surfaces with temporary, permanent, vegetative or biotechnical erosion control measures.
				2. Schedule the work so as to minimize the time that earth areas will be exposed to erosive conditions. Provide temporary structural measures immediately to prevent any soil erosion.
				3. Provide temporary seeding on disturbed earth or soil stockpiles exposed for more than 7 days or for any temporary shutdown of construction. In spring, summer or early fall apply rye grass at a rate of 1 lb/ 1000 sq.ft. In late fall or early spring, apply certified Aroostook Rye at a rate of 2.5 lbs./ 1000 sq. ft. Apply hay or straw at a rate of 2 bales/ 1000 sq. ft. or wood fiber hydromulch at the manufacturer’s recommended rate. Hay or straw shall be anchored.
				4. Coordinate the use of permanent controls or finish materials shown with the temporary erosion measures.
				5. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, or re-mulching, must be performed immediately.
				6. After final stabilization has been achieved temporary sediment and erosion controls must be removed. Areas disturbed during removal must be stabilized immediately.

END OF SECTION 312500