

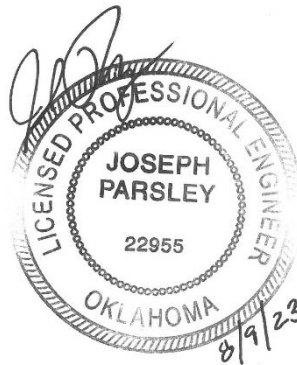
SEALS PAGE

PROJECT:

Name: Coweta Trails II Senior Apartments  
Location: Coweta, Oklahoma

CIVIL ENGINEERING CONSULTANT OF RECORD

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Civil Engineering Consultant of Record

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Division	Section Title
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## **DIVISION 2 - SITE CONSTRUCTION**

02220	SITE DEMOLITION
02230	SITE CLEARING
02300	EARTHWORK
02318	ROCK EXCAVATION
02340	SOIL STABILIZATION
02370	EROSION AND SEDIMENTATION CONTROL (INCLUDING SWPPP)
02375	STONE PROTECTION (RIP-RAP)
02510	WATER DISTRIBUTION
02535	SANITARY SEWAGE SYSTEMS
02536	SEWER MANHOLES, FRAMES, AND COVERS
02630	STORM DRAINAGE
02715	BASE COURSE
02740	ASPHALTIC CONCRETE PAVING
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02812	SITE IRRIGATION SYSTEM
02890	TRAFFIC SIGNS AND SIGNALS
02900	PLANTING

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## SECTION 02220 - SITE DEMOLITION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Demolition of structures, paving, and utilities.
  - 2. Filling voids created as a result of removals or demolition.
- B. Related Requirements:
  - 1. Regulatory Compliance:
    - a. Construction demolition waste management and disposal.
    - b. Disposal and removal of hazardous construction and demolition waste.
  - 2. Section 02230 - Site Clearing: Clearing of trees and other plant vegetation
  - 3. Section 02300 - Earthwork: Placement of fill material
  - 4. Section 02370 - Erosion and Sedimentation Control (Including SWPPP): Erosion protection during demolition operations.

#### 1.2 REGULATORY REQUIREMENTS

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. Occupational Safety and Health Administration (OSHA):
  - 1. OSHA 01926.1153 Respirable Crystalline Silica.

#### 1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable State and local codes for demolition of structures, safety of adjacent structures, dust control, runoff control, and pollution prevention.
- B. Obtain required permits and licenses from appropriate authorities. Pay associated fees including disposal charges.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct public or private roadways, sidewalks, or fire hydrants without appropriate permits or written authorization.
- E. If hazardous, contaminated materials or other environmental related conditions are discovered, stop work immediately and notify the Owner for action to be taken. Do not resume work until specifically authorized by the Construction Manager.
- F. Test soils around buried tanks for contamination. Coordinate notification for mobilization to site and required observation of tank removal with Owner.

#### 1.4 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of capped utilities and subsurface obstructions that will remain after demolition. Submit record as part of closeout submittals.

#### 1.5 PROJECT CONDITIONS

- A. Structures to be demolished will be discontinued in use and vacated prior to start of work.
- B. Owner assumes no responsibility for condition of structures to be demolished.

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- C. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as reasonably practical. Variations within structures may occur by Owner's removal and salvage operations prior to start of demolition work.
- D. Unless otherwise indicated in Contract Documents or specified by the Owner, items of salvageable value to Contractor shall be removed from site and structures. Storage or sale of removed items on site will not be permitted and shall not interfere with other work specified.
- E. Explosives shall not be brought to site or used without written consent of authorities having jurisdiction. Such written consent will not relieve the Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Performance of required blasting shall comply with governing regulations.

## PART 2 - PRODUCTS

### 2.1 FILL MATERIALS

- A. Fill material shall be aggregate fill materials as specified in Section 02300.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Provide, erect, and maintain erosion control devices, temporary barriers, and security devices at locations indicated on Construction Drawings.
- B. Protect existing landscaping materials, appurtenances, and structures, which are not to be demolished. Repair damage to existing items to remain caused by demolition operations.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary.
- D. Mark location of utilities. Protect and maintain in safe and operable condition utilities that are to remain. Prevent interruption of existing utility service to occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities and Owner.
- E. Notify adjacent property owners of work that may affect their property, potential noise, utility outages, or other disruptions. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property. Coordinate notice with Owner.

### 3.2 GENERAL DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent structures or pavements to remain.
- B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed by authority.
- C. Conduct operations with minimum of interference to public or private access. Maintain ingress and egress at all times.
- D. Sprinkle work with water to minimize dust. Provide hoses and water connections for this purpose.
- E. Comply with governing regulations pertaining to environmental protection.
- F. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

### 3.3 DEMOLITION

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- A. Demolish site improvements designated to be removed as shown on the drawings. Site improvements shall include but not be limited to structures, retaining walls, foundations, pavements, curbs and gutters, drainage structures, utilities, signage or landscaping.
- B. Disconnect and cap or remove utilities to be abandoned as shown on the drawings.
- C. Fill or remove underground tanks, piping, and appurtenances as shown.
- D. Demolish buildings completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to Owner and authorities having jurisdiction.
- E. Locate demolition equipment and remove materials to prevent excessive loading to supporting walls, floors, or framing.
- F. Demolish concrete and masonry in small sections. Remove slabs-on-grade and below grade construction as noted on the Construction Drawings.

#### 3.4 FILLING BASEMENTS AND VOIDS

- A. Completely fill below grade areas and voids resulting from demolition or removal of structures, underground fuel storage tanks, wells, cisterns, etc., using aggregate fill materials consisting of stone, gravel, or sand free from debris, trash, frozen materials, roots, and other organic matter.
- B. Areas to be filled shall be free of standing water, frost, frozen or unsuitable material, trash, and debris prior to fill placement.
- C. Place fill materials in accordance with Section 02300 unless subsequent excavation for new work is required.
- D. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

#### 3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from site debris, rubbish, and other materials resulting from demolition operations. Leave areas of work in clean condition.
- B. No burning of any material, debris, or trash on-site or off-site will be allowed except when allowed by appropriate governing authority and Owner. If allowed as stated above, burning shall be performed in manner prescribed by governing authority. Attend burning materials until fires have burned out and have been completely extinguished.
- C. Transport materials removed from demolished structures with appropriate vehicles and dispose off-site to areas that are approved for disposal by governing authorities and appropriate property owners.

END OF SECTION

## SECTION 02230 - SITE CLEARING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cleaning site of debris, grass, trees, and other plant life in preparation for site or building earthwork.
  - 2. Protection of existing structures, trees, or vegetation indicated on the Construction Drawings to remain.
- B. Related Requirements:
  - 1. Section 02220 – Site Demolition: Demolition and removal of structures, paving, utilities and other improvements.
  - 2. Section 02300 – Earthwork: Stripping and removal of topsoil.
  - 3. Section 02370 - Erosion And Sedimentation Control (Including SWPPP)

#### 1.2 ENVIRONMENTAL REQUIREMENTS

- A. Construct temporary erosion and sediment control systems as shown on Construction Drawings and as directed by the "Storm Water Pollution Prevention Plan" (SWPPP) to protect adjacent properties and water resources from erosion and sedimentation.
- B. In event that sitework on this project will disturb one or more acres, starting work shall be strictly governed by the sequence of construction as specified in Section 02370 and SWPPP site maps. Contractor shall not begin construction without "National Pollution Discharge Elimination System" (NPDES) permit governing discharge of storm water from site for entire construction period. NPDES permit requires SWPPP to be in place during construction.
- C. Clearing and grubbing shall commence in the proper sequence as stated in the Phase I of the Best Management Practice Sequence specified in Section 02370 and on the SWPPP site map and subsequent to the halt in construction for performance of the inspection and certification of BMPs as stated.
- D. Contractor shall conduct storm water management practices in accordance with the project SWPPP and applicable NPDES permit and shall enforce action taken or imposed by Federal or State agencies, including cost of fines, construction delays, and remedial actions resulting from Contractor's failure to comply with provisions of NPDES permit.

#### 1.3 PROJECT CONDITIONS

- A. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as reasonably practical.

### PART 2 - PRODUCTS

Not Used

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Identify existing plant life that is to remain and verify clearing limits are clearly tagged, identified, and marked in such manner as to ensure their protection throughout construction operations.

#### 3.2 PROTECTION

- A. Locate, identify, and protect existing utilities that are to remain.
- B. Protect trees, plant growth, and features designated to remain as part of final landscaping.
- C. Conduct operations with minimum interference to public or private accesses and facilities. Maintain ingress and egress at all times and clean or sweep roadways daily as required by SWPPP or governing authority. Dust control shall be provided with sprinkling systems or equipment provided by Contractor.
- D. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by a licensed land surveyor and replaced, as necessary, in kind.
- E. Provide traffic control as required, in accordance with the US Department of Transportation's "Manual on Uniform Traffic Control Devices" and applicable state highway department requirements.

### 3.3 EQUIPMENT

- A. Material shall be transported to and from the project site using well-maintained and operating vehicles. Transporting vehicles operating on site shall stay on designated haul roads and shall not endanger improvements by rutting, overloading, or pumping.

### 3.4 CLEARING

- A. Clear areas required for access to site and execution of work.
- B. Unless otherwise indicated on Construction Drawings, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Depressions caused by clearing and grubbing operations shall be filled to subgrade elevation to avoid ponding of water. Satisfactory fill material shall be placed in accordance with Section 02300.
- C. Remove grass, trees, plant life, stumps, and other construction debris from site to dump site that is suitable for handling such material according to state laws and regulations.
- D. Cut heavy growths of grass from areas before stripping and topsoil removal and remove cuttings with remainder of cleared vegetative material.

END OF SECTION

## SECTION 02300 - EARTHWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Excavation, filling, and backfilling for structures, pavement, and outparcels.
  - 2. Trenching and backfilling for utilities.
  - 3. Dewatering.
  - 4. Boring under crossings.
- B. Related Requirements:
  - 1. Section 02340 - Soil Stabilization.
  - 2. Section 02370 - Erosion Control and Sedimentation. Temporary and permanent erosion control.
  - 3. Section 02375 - Stone Protection. Rip-rap stone for slope protection.
  - 4. Section 02900 - Planting.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM)
  - 1. ASTM D422 - Particle Size Analysis of Soil.
  - 2. ASTM D698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN.m/m<sup>3</sup>)).
  - 3. ASTM D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN.m/m<sup>3</sup>)).
  - 4. ASTM D2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).
  - 5. ASTM D2488 - Description and Identification of Soils (Visual-Manual Procedures).
  - 6. ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  - 7. ASTM D6938 - In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
  - 8. ASTM D2321-11 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- C. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. AASHTO T 88 - Particle Size Analysis of Soils.
- D. Oklahoma Department of Transportation (ODOT):
  - 1. Standard Specifications for Highway Construction, 2019 Edition.
- E. National Fire Protection Association (NFPA)
  - 1. NFPA 70 - National Electrical Code.
- F. American Water Works Association (AWWA)
  - 1. AWWA C200 - Standard for Steel Water Pipe - 6 In. (150 mm) and Larger.
  - 2. AWWA C206 - Field Welding Of Steel Water Pipe.

#### 1.3 DEFINITIONS

- A. Satisfactory Materials: ASTM D2487 soil classification groups GW, GP, GM, SW, SP, SM, ML, CL, or a combination of these group symbols.
1. Satisfactory materials shall be free of rock or gravel larger than allowed for fill or backfill material as specified hereinafter or as shown on the drawings.
  2. Satisfactory materials shall contain no debris, waste, frozen materials, vegetation, and other deleterious matter.
  3. Unless specifically stated otherwise on the Drawings, the following table stipulates allowable satisfactory materials to be used as fill in specified areas:

Fill Placement Criteria					
Material	Proctor	Maximum Dry Density	Placement Moisture Content Range	Liquid Limit	Plastic Index
Structural Fill (Import)	Standard (ASTM D-698)	95%	0% to +2%	35	8 to 15
Structural Fill (Lime Stabilized Clay)			≥3%	35	8 to 15
Parking Lot Areas (Lime Stabilized)			≥2%	<45	<30
Parking Lot Areas (Un-Stabilized)			0% to ±2%	<45	<30
Landscaped Areas			±2%	<45	<30

- B. Unsatisfactory Materials: Materials which do not comply with the requirements for satisfactory materials are unsatisfactory.
1. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory materials which contains root and other organic matter or frozen material. The Owner shall be notified of any contaminated materials.
  2. Unsatisfactory materials also include satisfactory materials not maintained within the allowable moisture contents at time of compaction as specified above.

#### 1.4 SUBMITTALS

- Submit 30-pound sample of each type of off-site fill material that is to be used at the site in airtight containers to the independent testing laboratory or submit gradation and certification of aggregate material that is to be used at the site to the independent testing laboratory for review.
- Submit gradation and certification of aggregate material that is to be used for trench bedding, haunching, and initial and final backfill for all utility and storm sewer installations to the Engineer for review.
- Submit name of each material supplier and specific type and source of each material. Change in source throughout project requires approval of Owner.
- Submit Dewatering Plans upon request by Owner.
- Shop drawings or details pertaining to excavating and filling are not required unless otherwise shown on the Drawings or if contrary procedures to Construction Documents are proposed.
- Shop drawings or details pertaining to site utilities are not required unless required by regulatory authorities or unless uses of materials, methods, equipment, or procedures that are contrary to The Drawings or Specifications are proposed. Do not perform work until Owner has accepted required shop drawings.

- G. Contact utility companies and determine if additional easements will be required to complete project. Provide written confirmation of the status of all easements to Owner at time of Preconstruction Conference or no later than 90 days prior to project possession date.

## PART 2 - PRODUCTS

### 2.1 SOIL AND ROCK MATERIALS

- A. Fill and Backfill. Satisfactory materials excavated from the site.
- B. Imported Fill Material: Satisfactory material provided from offsite borrow areas when sufficient satisfactory materials are not available from required excavations.
- C. Trench Backfill: ASTM D2321-11 unless otherwise specified or shown on the drawings. An open-graded material meeting the requirements of ASTM D2321-11 may be used only if the material is wrapped in an approved filter or drainage fabric (See Section 2.2.B. below) and with written permission from the Engineer.
- D. Building Subbase Material: Refer to Architectural Specifications.
- E. Bedding: Aggregate Type as indicated on the plans or naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; an open-graded material meeting the requirements of ASTM D2321-11 may be used only if the material is wrapped in an approved filter or drainage fabric (See Section 2.2.B. below) and with written permission from the Engineer.
- F. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch sieve and 0 to 5 percent passing a No.8 sieve. Drainage fill, where required, shall be wrapped in an approved filter or drainage fabric (See Section 2.2.B. below).
- G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No.4 sieve. Filter material, where required, shall be wrapped in an approved filter or drainage fabric (See Section 2.2.B. below).
- H. Topsoil: Topsoil shall consist of stripping material excavated from the site. Topsoil shall consist of organic surficial soil found in depth of not more than 6-inches. Topsoil shall be as further defined in Section 02900 – Planting.
- I. Pond Liner: Unless otherwise specified on the construction drawings, an impervious liner shall be placed in the bottoms and side of ponds, basins, forebays, etc. designed to normally hold water. The liner shall be a minimum of 24 inches thick, consist of clay material, and have a maximum permeability of  $10^{-7}$  cm/s.

### 2.2 APPURTENANT MATERIALS

- A. Stabilization fabrics and geogrids: As specified in Section 02340.
- B. Filter and drainage fabrics: As specified in Section 02340.
- C. Steel Casing Pipe: Comply with ASTM A 53 Grade A or B, size, and wall thickness as indicated on The Drawings.
- D. Trench Utility Locator Tape: Heavy duty 6" wide underground warning tape. Tape shall be made from polyethylene material, 3.5 mils thick, with a minimum tensile strength of 1,750 psi. Place the tape at one-half the minimum depth of cover for the utility line or a maximum of 3 feet, whichever is the less, but never above the top of subgrade. Color of tape shall be determined by as follows:
  - 1. Natural Gas or Propane – Yellow.
  - 2. Electric – Red.

3. Telephone – Orange.
4. Water – Blue.
5. Sanitary Sewer – Green.

## 2.3 EQUIPMENT

- A. Transport off-site materials to project using well-maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

## 2.4 SOURCE QUALITY CONTROL

- A. Laboratory testing of materials proposed for use in the project shall be by the Owner's Construction Testing Laboratory. The Contractor shall provide samples of material obtained off-site.
- B. Perform California Bearing Ratio (CBR) tests in outparcels and areas to receive pavement for each type of material that is imported from off-site. CBR value shall be equal to or above pavement design subgrade CBR value indicated on Construction Drawings.
- C. Following tests shall be performed on each type of on-site or imported soil material used as compacted fill:
  1. Moisture and Density Relationship: ASTM D698
  2. Mechanical Analysis: AASHTO T88 or ASTM D422.
  3. Plasticity Index: ASTM D4318.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Identify required lines, levels, contours, datum, elevations, and grades necessary for construction as shown on the drawings.
- B. Notify utility companies to remove or relocate public utilities that are in conflict with proposed improvements.
- C. Protect plant life, lawns, fences, existing structures, sidewalks, paving, and curbs, unless otherwise noted on the drawings from excavating equipment and vehicular traffic.
- D. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
- E. Remove from site, material encountered in grading operations that is unsatisfactory material or undesirable for backfilling, subgrade, or foundation purposes. Dispose of in manner satisfactory to Owner and local governing agencies. Backfill areas with layers of satisfactory material and compact as specified herein.
- F. Prior to placing fill in low areas, such as previously existing creeks, ponds, or lakes, perform following procedures:
  1. Drain water out by gravity with ditch having flow line lower than lowest elevation in low area. If drainage cannot be performed by gravity ditch, use adequate pump to obtain the same results.
  2. After drainage of low area is complete, remove muck, mud, debris, and other unsatisfactory material by using acceptable equipment and methods that will keep natural soils underlying low area dry and undisturbed.
  3. All muck, mud, and other materials removed from low areas shall be dried on-site by spreading in thin layers for observation. Material shall be inspected and, if found to be satisfactory for use as fill material, shall be incorporated into lowest elevation of site filling operation, but not under building subgrade or within 5'-0" of perimeter of building subgrade, paving or outparcel subgrade. If, after observation, material is found to be unsatisfactory, it shall be removed from site.
- G. Locate and identify utilities that have previously been installed and protect from damage.

- H. Locate and identify existing utilities that are to remain and protect from damage.
- I. Maintain in operating condition existing utilities, previously installed utilities, and drainage systems encountered in utility installation. Repair surface or subsurface improvements shown on the Drawings.
- J. Verify location, size, elevation, and other pertinent data required making connections to existing utilities and drainage systems as indicated on the Drawings.
- K. Over excavate and properly prepare areas of subgrade that are not capable of supporting proposed systems. Stabilize these areas by using acceptable geotextile fabrics or aggregate material placed and compacted as specified in Section 02340.

### 3.2 DEWATERING

#### A. General:

1. Dewatering activities shall conform to applicable provisions in 02370.
2. Provide dewatering systems as required for excavations.
3. Design and provide dewatering system using accepted and professional methods consistent with current industry practice to eliminate water entering the excavation under hydrostatic head from the bottom or sides. Design system to prevent differential hydrostatic head, which would result in floating out soil particles in a manner, termed as a “quick” or “boiling” condition. System shall not be dependent solely upon sumps or pumping water from within the excavation where differential head would result in a quick condition, which would continue to worsen the integrity of the excavation’s stability.
4. Provide dewatering system of sufficient size and capacity to prevent ground and surface water flow into the excavation and to allow Work to be installed in a dry condition.
5. Control, by acceptable means, all water regardless of source. Contractor shall be responsible for disposal of the water.
6. Control groundwater in a manner that preserves strength of foundation soils, does not cause instability or raveling of excavation slopes, and does not result in damage to existing structures. Where necessary, lower water level in advance of excavation utilizing wells, wellpoints, jet educators, or similar positive methods. The water level as measured by piezometers shall be maintained a minimum of 3 feet below prevailing excavation level.
7. Commence dewatering prior to any appearance of water in excavation and continue until Work is complete to the extent that no damage results from hydrostatic pressure, flotation, or other causes.
8. Open pumping with sumps and ditches will be allowed provided it does not result in boils, loss of fines, softening of the ground, or instability of slopes.
9. Install wells or wellpoints, if required, with suitable screens and filters so that continuous pumping of fines does not occur. Arrange discharge to facilitate collection of samples by the Owner. During normal pumping and upon development of wells, levels of fine sand or silt in the discharge water shall not exceed 5 ppm. Install sand tester on discharge of each pump during testing to verify that levels are not exceeded.
10. Control grading around excavations to prevent surface water from flowing into excavation areas.
11. No additional payment will be made for any supplemental measures to control seepage, groundwater, or artesian head.

#### B. Design:

1. Designate and obtain the services of a qualified dewatering specialist to provide dewatering plan as may be necessary to complete the Work.
2. Contractor shall be responsible for the accuracy of the drawings, design data, and operational records required.
3. Contractor shall be responsible for the design, installation, operation, maintenance, and any failure of any component of the system.

#### C. Damages:

1. Contractor shall be responsible for and shall repair any damage to work in place, other contractor’s equipment, utilities, residences, highways, roads, railroads, private and municipal well systems, adjacent structures, natural resources, habitat, existing wells, and the excavation. Contractor responsibility shall also include, damage to the bottom due to heave and including but not limited to, removal and pumping out of

- the excavated area that may result from Contractor's negligence, inadequate or improper design and operation of the dewatering system, and any mechanical or electrical failure of the dewatering system.
2. Remove subgrade materials rendered unsatisfactory by excessive wetting and replace with approved backfill material at no additional cost to the Owner.

D. Maintaining Excavation in Dewatering Condition:

1. Dewatering shall be a continuous operation. Interruptions due to power outages or any other reason will not be permitted.
2. Continuously maintain excavation in a dry condition with positive dewatering methods during preparation of subgrade, installation of pipe, and construction of structures until the critical period of construction or backfill is completed to prevent damage of subgrade support, piping, structure, side slopes, or adjacent facilities from flotation or other hydrostatic pressure imbalance.
3. Provide standby equipment on site, installed, wired, and available for immediate operation if required to maintain dewatering on a continuous basis in the event any part of the system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, perform such work as may be required to restore damaged structures and foundation soils at no additional cost to Owner.
4. System maintenance shall include but not be limited to 24-hour supervision by personnel skilled in the operation, maintenance, and replacement of system components and any other work required to maintain excavation in dewatered condition.

E. System Removal: Upon completion of the work, remove dewatering equipment from the site, including related temporary electrical service.

F. Wells shall be removed or cut off a minimum of 3 feet below final ground surface, capped, and abandoned in accordance with regulations by agencies having jurisdiction.

### 3.3 TOPSOIL EXCAVATION

- A. Cut heavy growths of grass from areas before stripping and remove cuttings with remainder of cleared vegetative material.
- B. Strip topsoil to a depth of not less than 6 inches from areas that are to be filled, excavated, landscaped, or re-graded to such depth that it prevents intermingling with underlying subsoil or questionable material.
- C. Stockpile topsoil in storage piles in areas shown on The Drawings or where directed by Owner. Construct storage piles to freely drain surface water. Cover storage piles as required to prevent windblown dust. Dispose of unsuitable topsoil as specified for waste material, unless otherwise specified by Owner. Remove excess topsoil from site unless specifically noted otherwise on the Drawings.

### 3.4 GENERAL EXCAVATION

- A. Classification of Excavation: The Contractor shall assure himself by site investigation or other necessary means that he is familiar with the type, quantity, quality, and character of excavation work to be performed. Excavation shall be considered unclassified excavation.
- B. When performing grading operations during periods of wet weather, provide adequate dewatering, drainage and ground water management to control moisture of soils.
- C. Shore, brace, and drain excavations as necessary to maintain excavation as safe, secure, and free of water at all times.
- D. Excavate building areas to line and grade as shown on the Drawings being careful not to over excavate beyond elevations needed for building subgrades.
- E. Place satisfactory excavated material into project fill areas.

- F. Unsatisfactory excavated material shall be disposed of in manner and location that is acceptable to Owner and local governing agencies.
- G. Perform excavation using capable, well-maintained equipment and methods acceptable to Owner and local governing agencies.
- H. All pipes that penetrate levees, including permanent outlet control devices and temporary discharge pipes from sedimentation ponds, shall be constructed in conjunction with fill placement to ensure these drainage devices are properly placed and the surrounding backfill is adequately tied to the basin levee. Trenching of levees is not permitted. All materials in the levee, including bedding materials for the discharge devices, shall be low permeability, cohesive soils. Soil exhibiting high shrink/swell potential or containing greater than 5% organics shall not be used. Contractor shall provide progressive pictures of the pipe installation to the Owner to document the installation.

### 3.5 ROCK EXCAVATION

- A. Rock excavation is specified in Section 02318.

### 3.6 TRENCHING EXCAVATION FOR UTILITIES

- A. Contact local utility companies before excavation begins. Dig trench at proper width and depth for laying pipe, conduit, or cable. Cut trench banks vertical, if possible, and remove stones from bottom of trench as necessary to avoid point-bearing. Over-excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding. Replace over-excavation with satisfactory material and dispose of unsatisfactory material.
- B. Trench excavation sidewalls shall be sloped, shored, sheeted, braced, or otherwise supported by means of sufficient strength to protect workmen in accordance with applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to exit ladder or steps shall not be greater than 25 feet in trenches 4 feet or deeper.
- C. Perform trench excavation as indicated on the Drawings for specified depths. During excavation, stockpile materials suitable for backfilling in orderly manner far enough from bank of trench to avoid overloading, slides, or cave-ins.
- D. Remove excavated materials not required or not satisfactory as backfill or embankments and waste off-site or at on-site locations approved by the Owner and in accordance with governing regulations. Dispose of structures discovered during excavation as specified in Section 02220.
- E. Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches and other excavations as specified.
- F. Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill.
- G. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer, or wider than needed to make joint connection properly.
- H. Trench width below top of pipe shall not be less than 12 inches nor more than 18 inches wider than outside surface of pipe or conduit that is to be installed to designated elevations and grades. Other trench width for pipe, conduit, or cable shall be least practical width that will allow for proper compaction of trench backfill.
- I. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances, whichever is more stringent:

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1. Water Mains: 48 inches to top of pipe barrel or 6 inches below frost line, established by local building official, whichever is deeper.
2. Sanitary Sewer: Elevations and grades as indicated on the drawings and as specified in Section 02535.
3. Storm Sewer: Elevations and grades as indicated on the Drawings.
4. Electrical Conduits: 24 - 60 inches to top of conduit or as required by NEC 300-5, NEC 710-36 codes, or local utility company requirements, whichever is deeper.
5. TV Conduits: 18 inches minimum to top of conduit or as required by local utility company, whichever is deeper.
6. Telephone Conduits: 18 inches minimum to top of conduit, or as required by local utility company, whichever is deeper.
7. Gas Mains and Service: 30 inches minimum to top of pipe, or as required by local utility company, whichever is deeper.

The above noted depths are minimum requirements. Except where specific elevations and grades are indicated on the drawings, the contractor shall increase the depth as necessary, upon approval of the respective utility company, to ensure minimum clearances and separations are maintained.

### 3.7 SUBGRADE PREPARATION

- A. Scarification and Compaction: Areas exposed by excavation or stripping and on which subgrade preparations are to be performed shall be scarified to minimum depth of 8 inches and compacted as specified hereinafter.
- B. Proofrolling: Subgrades shall be proofrolled by the contractor in the presence of the Owner's Construction Materials Laboratory to detect areas of insufficient compaction and soft pocket, or areas of excess yielding. Proofrolling shall be accomplished by making minimum of two complete passes with fully-loaded tandem-axle dump truck (typically 10 tons/axle), or approved equal, in each of two perpendicular directions. Limit vehicle speed to three mph. Areas of failure such as soft spots, unsatisfactory soils, and areas of excessive pumping or rutting shall be excavated and re-compacted as specified herein. Continual failure areas shall be stabilized in accordance with Section 02340 at no additional cost to Owner. Subgrade exposed longer than 48 hours or on which precipitation has occurred shall be re-proofrolled. The Owner's CTL will document the proofrolling procedure, specific locations, deficiencies, and corrective measures taken by the Contractor.
- C. Hand Auger Probing: In small areas where proof rolling is not practical, hand auger probing may be necessary in lieu of proofrolling to ensure the subgrade soils are well compacted, stable and unyielding prior to placing fill or constructing improvements above those soils. Hand auger probing in these areas shall consist of shallow hand auger borings to penetrate any disturbed portions of the subgrade and then using DCP testing, steel probe testing or other testing procedures, as approved by the Owner and Engineer, necessary to ensure the subgrade is stable and unyielding prior to placing new stone base and pavements. Retesting of the subgrade will be required if the new stone base and pavements are not placed within the time limits outlined in the specifications or if the subgrade is subjected to unfavorable weather conditions

### 3.8 FILLING

- A. Fill areas to contours and elevations shown on the Drawings with materials deemed satisfactory.
- B. Place fills in continuous lifts specified herein.
- C. Fill within proposed building subgrade, paving subgrade, and outparcel subgrades shall not contain rock or stone greater than 2 inches in any dimension unless noted otherwise
- D. Unless otherwise specified for rock fill, rock or stone less than 6-inches in largest dimension may be used in fill below structures, paving, outparcels, and graded areas, up to 24 inches below surface of proposed subgrade or finish grade of graded areas when mixed with satisfactory material. Rock or stone less than 2 inches in largest dimension may be used in fill within the upper 24 inches of proposed subgrade or finish grade of graded areas when mixed with satisfactory material.
- E. Fill materials used in preparation of subgrade shall be placed in lifts or layers not to exceed 8 inches loose measure and compacted as specified hereinafter.

- F. Material imported from off-site shall have CBR value equal to or above pavement design subgrade CBR value indicated on The Drawings.
- G. Building area subgrade pad shall be that portion of site directly beneath and 5 feet beyond building and appurtenances, including limits of future building expansion areas as shown on the Drawings.

3.9 NOT USED

3.10 PIPE BEDDING

- A. Excavate trenches for pipe or conduit to 4 inches below bottom of pipe and to the width as specified herein. Place 4 inches of bedding material, compact in bottom of trench, and shape to conform to lower portion of pipe barrel.
- B. Place geotextile fabric as specified on the Drawings and in accordance with Section 02340.

3.11 TRENCH BACKFILLING

- A. Materials used for trench backfill shall comply with requirements as specified herein.
- B. Backfill and compact in accordance with fill and compaction requirements in ASTM D2321 unless otherwise shown on the drawings.
- C. Do not backfill trenches until required tests are performed and utility systems comply with and are accepted by applicable governing authorities.
- D. Backfill trenches to contours and elevations shown on the Drawings.
- E. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- F. All trenches in non-pavement areas shall be capped with 12" of low plasticity cohesive fill to reduce the infiltration and conveyance of surface water through the trench backfill. It will be permissible to reduce the thickness of the cap in small isolated areas where the 12" thickness is not achievable due to design grades and/or utility burial depths. A 9" thick cap may be utilized in these areas.
- G. All trenches that extend into the building pad and are sloped toward the building shall have a "plug" of 5 feet in length consisting of low plasticity cohesive fill or with lean concrete/flowable fill.

3.12 BORINGS AND CASINGS UNDER ROADS, HIGHWAYS, AND RAILROAD CROSSINGS

- A. When indicated by the Drawings, street, road, highway, or railroad crossings for utility mains installed by jacking and boring method shall be in accordance with area specifications and governing authorities.
- B. Excavation of approach pits and trenches within right-of-way of street, road, highway, or railroad shall be of sufficient distance from paving or railroad tracks to permit traffic to pass without interference. Tamp backfill for approach pits and trenches within right-of-way in layers not greater than 6-inches thick for entire length and depth of trench or pit. Compact backfill to 95 percent of maximum dry density in accordance with ASTM D698, obtained at optimum moisture as determined by AASHTO T180. Mechanical tampers may be used after cover of 6 inches has been obtained over top of barrel of pipe.
- C. Accomplish boring operation using commercial type boring rig. Bore hole to proper alignment and grade. Bore hole shall be within 2 inches of same diameter as largest outside joint diameter of pipe installed. Install pipe in hole immediately after bore has been made and in no instance shall hole be left unattended while open.
- D. In event subsurface operations result in failure or damage to pavement or railroad tracks within 1 year of construction, make necessary repairs to pavement or railroad tracks. If paving cracks on either side of pipe line or is otherwise disturbed or broken due to construction operations, repair or replace disturbed or broken area.

- E. Clean, prime, and line interior and exterior of casing pipe with two coats of asphalt coating in accordance with and governing authorities.
- F. Butt weld steel casing. Welds shall be full penetration single butt-welds in accordance with AWWA C206.
- G. Install casing and utility pipe with end seals, vent pipe, and other special equipment in accordance with area specifications and governing authorities.

### 3.13 COMPACTION

- A. Compact as follows:
 

<u>Location</u>	Percent of Maximum Laboratory Density
Subgrade & Fill in All Areas	<u>ASTM D-698</u>
	95
- B. Maintain moisture content as specified in 1.3.A.3.
- C. Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.
- D. Corrective Measures for Non-Complying Compaction: Remove and recompact deficient areas until proper compaction is obtained. Continual failure areas shall be stabilized in accordance with Section 02340 at no additional cost to Owner.

### 3.14 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades to ensure proper elevation and conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks, dump trucks, and other construction equipment.
- C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in manner that will comply with compaction requirements by use of material with CBR equal to or better than that specified on the drawings. Surface of subgrade after compaction shall be firm, uniform, smooth, stable, and true to grade and cross-section.
- D. Construct temporary ditches and perform such grading as necessary to maintain positive drainage away from subgrade at all times.

### 3.15 BORROW AND SPOIL SITES

- A. Comply with NPDES and local erosion control permitting requirements for any and all on-site and off-site, disturbed spoil and borrow areas. Upon completion of spoil or borrow operations, clean up spoil or borrow areas in a neat and reasonable manner to the satisfaction of Owner or off-site property owner, if applicable.

### 3.16 FINISH GRADING

- A. Check grading of building subgrades by string line from grade stakes (blue tops) set at not more than 50-foot centers. Allowable tolerance shall be plus or minus 0.10 feet from plan grade. Provide engineering and field staking as necessary for verification of lines, grades, and elevations.
- B. Grade areas where finish grade elevations or contours are indicated on the Drawings, other than paved areas, outparcels, and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Ground surfaces shall vary uniformly between indicated elevations. Grade finished ditches to allow for proper drainage without ponding and in manner that will minimize erosion potential. For topsoil, sodding, and seeding requirements refer to Section 02900.

- C. Correct settled and eroded areas within 1 year after date of completion at no additional expense to Owner. Bring grades to proper elevation.

### 3.17 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor as necessary to assure compliance with Contract requirements. Owner T&I specified below shall not be considered a substitute for the Contractor's responsibility to perform similar routine, necessary, and customary testing and inspection of the methods and frequency suitable for the type of work involved.
- B. The Owner will perform testing and inspection (T & I) but only as a means of verification to the Owner of Contractor quality control performance.

### 3.18 OWNER TESTING AND INSPECTION (T&I)

- A. Testing and inspection shall be either continuous or periodic as follows:
  - 1. Continuous: Perform in areas supporting a structure including, but not limited to, building pad area, retaining walls, etc. When continuous testing and inspection is in progress, conduct testing and inspection in areas outside building pad or structure at the frequencies stated herein. This shall include, but not limited to, the CTL requesting and reviewing GC proofrolling documentation to assure correctness and completeness of proofrolling and any associated corrective actions taken by the Contractor.
  - 2. Periodic: In addition to continuous inspections specified above, perform unannounced periodic testing visits as follows when continuous testing is not being performed as described above:
    - a. Two days during the first week when earthwork starts in a paved area.
    - b. Two days each week thereafter until earthwork is complete.
- B. Test Frequency:
  - 1. Number of tests to be taken at each site visit shall be the test frequencies stated based on quantities or occurrences which have accumulated up to, in between, or during each periodic visit.
  - 2. Not less than one specified test shall be conducted each periodic visit when material has been placed since last visit.
  - 3. In addition, at least one specified test shall be conducted on work being placed during each periodic visit.
- C. Field testing, frequency, and methods may vary as determined by and between the Owner and the CTL.
- D. Work shall be performed by a Special Inspector – Technical I unless specified otherwise. Report of testing and inspection results shall be made upon the completion of testing.
- E. Classification of Materials: Perform test for classification of materials used and encountered during construction in accordance with ASTM D2488 and ASTM D2487.
- F. Laboratory Testing Of Materials: Perform laboratory testing of materials (Proctor, Sieve Analysis, Atterberg Limits, Consolidation Test, etc.) as specified.
- G. Proofrolling: Document and explain proofrolling inspection procedures and results in the laboratory inspection report.
- H. Field Density Tests (A minimum of two compaction tests are required for each layer of fill placed.)
  - 1. Building Subgrade Areas, Including 5'-0" Outside of Exterior Building Lines: In cut areas, not less than one compaction test for every 2,500 sq. ft and at locations along all continuous wall footings with intervals not exceeding 100 feet and at each column spread footing. In fill areas, same rate of testing for each 8-inch lift, measured loose and at locations along continuous wall footings with intervals not exceeding 100 feet and at each column spread footing.
    - a. Density tests on top of building subgrade shall be performed within 48 hours prior to placement of overlying materials. If inclement weather occurs after testing, retest prior to placement of overlying materials.
  - 2. Paving Areas and other Areas of Construction Exclusive of Building Subgrade:

- a. In cut areas, not less than one compaction test for every 10,000 sq. ft. In fill areas, same rate of testing for each 8-inch lift, measured loose.
    - b. Truck Route Drives: One compaction test performed per 5,000 square feet of fill per lift.
    - c. Bedding, Haunching, and Initial and Final Backfill for Utility and Storm Sewer Trenches: Intervals not exceeding 200-feet of trench for every 4 to 6-inch lift of compacted trench backfill.
  3. Test Method: In-place nuclear density, ASTM D6938.
- I. Observation and Inspection:
1. Observe all subgrades/excavation bases below footings and slabs and verify design bearing capacity is achieved as required. Work shall be performed by a Special Inspector – Technical II.
  2. Observe and document presence of groundwater within excavations.

END OF SECTION

## SECTION 02318 - ROCK EXCAVATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Removal including, drilling, blasting, and protection of rock excavation.
- B. Related Requirements:
  - 1. Section 02230 – Site Clearing. Clearing of trees, brush, and vegetation prior to excavation.
  - 2. Section 02300 – Earthwork: Excavation, filling, and compaction of earth materials and rock fill.

#### 1.2 [RESERVED]

#### 1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. National Fire Protection Association (NFPA)
  - 1. NFPA495 - Code for Manufacturing, Transportation, Storage, And Use of Explosive Material
- C. United States Department of Interior, Bureau of Mines
  - 1. Seismic Effects of Blasting
- D. Occupational Safety & Health Administration (OSHA)
  - 1. 29CFR1910.109 - Explosives and Blasting Agents

#### 1.4 DEFINITIONS

- A. Rock Excavation: Removal of igneous, metamorphic, or sedimentary rock or stone, boulders over two cubic yards in volume in open areas and one cubic yard in volume in trenches; and masonry, concrete, or solid frozen soil that cannot be removed by rippers or other mechanical methods and, therefore, requires drilling and blasting.
  - 1. The excavation and disposal of all "Rock Excavation" that is indicated by the Soils Report shall be considered unclassified excavation and shall be included with site work grading as part of the lump sum base bid.
  - 2. If "Rock Excavation" is required that is not indicated by the Soils Report, the Owner shall be notified prior to such rock excavation, and he must then visit the site and verify the necessity for excess "Rock Excavation," determine an estimated quantity and provide the Contractor written approval to proceed. In the event the estimated quantity is exceeded, the Owner shall again be notified to establish a revised estimated quantity and authorize the Contractor to proceed. Payment for the authorized work shall be by a Change Order to the Contract. .
- B. Trenches: Excavations having vertical sides whose depths exceed its width, made for storm water drainage, sanitary sewer, water, and gas pipes, electric, communications, and steam conduits, and related uses.

#### 1.5 SUBMITTALS

- A. Submit Blasting Plan prior to any blasting and Monitoring Reports to the Owner and Governing Agencies for review.

#### 1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA495, Bureau of Mines Seismic Effects of Blasting, and OSHA 29CFR1910.109 as applicable.

- B. Comply with all applicable laws, rules, ordinances and regulations of the Federal, State and local regulatory authorities and insurers that govern the licensing, transportation, storage, handling, use, and disposition of explosives.
- C. Prior to rock excavation, obtain and pay for all powder and blasting permits and licenses from regulatory agencies.
- D. If blasting is required or undertaken, the responsible Subcontractor shall be licensed in the State and shall possess a current blasting license issued by the appropriate regulatory authority and be permitted for the transportation of explosives if required.
- E. In case of conflict between regulations or between regulations and Specifications, the Contractor shall comply with the strictest applicable codes, regulations or Specifications.

#### 1.7 SITE CONDITIONS

- A. Environmental Requirements: Determine environmental effects associated with proposed work and safeguard those concerns as regulated by law and local governing agencies by reasonable and practical methods.
- B. Existing Conditions: The Contractor shall be responsible for any and all damage and/or injury from the use of explosives. The Contractor shall save and hold harmless the Owner, Architect and Engineer from any and all claims from the use of explosives. Removal of materials of any nature by blasting shall be done in such a manner and at such times as to avoid damage affecting integrity of existing construction and damage to new or existing dwellings, structures and water wells in or adjacent to the area of the work. It shall be the Contractor's responsibility to determine the method of operation to ensure desired results and integrity of completed work. All damage caused by the Contractor's blasting operations shall be repaired to the full satisfaction of the Owner at no additional cost to the Owner.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Explosives, detonator/delay device, and blast mat materials shall be type recommended by explosive supplier and shall comply with requirements specified herein.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Verify site conditions and note subsurface conditions affecting work of this section.
- B. Identify required lines, levels, and elevations that will determine extent of proposed removals.

#### 3.2 ROCK EXCAVATION

- A. Cut rock to form level bearing at bottom of footing and trench excavations. Remove shaled layers to provide sound and unshattered base for footings or foundations. Contractor shall consider reuse of excavated materials on site in accordance with Section 02300. If material cannot be utilized on site, dispose of material offsite.
- B. If placed in embankments, perform rock excavation in manner that will produce material of such size as in accordance with Section 02300. Remove rock to allow for construction and/or installation of the site and building improvements as indicated on Construction Drawings. Remove loose or shattered rock, overhanging ledges and boulders which might dislodge.
- C. Use lean concrete or suitable materials as directed by registered geotechnical engineer to replace rock overblast or over excavation in building and expansion area to facilitate placement of utilities and foundations systems.

### 3.3 ROCK BLASTING

#### A. General

1. The drilling and blasting methods and programs shall be those necessary to accomplish any and all rock excavation required for completion of the improvements shown on the Construction Drawings in accordance with the procedures specified herein. Do not use explosives as a primary means of transporting material outside the excavated prism.
2. Blasting work shall be performed only with necessary permits from all regulatory authorities and after completion of the preblast survey. Blasting work shall take place only after persons in the vicinity have been notified and have reached positions of safety. Take appropriate precautions to prevent all persons from entering the blasting area. Use methods and programs that will prevent damage to, but not limited to, adjacent dwellings, structures, public domain, natural resources, habitat, existing wells and landscape features and that will minimize the scattering of rock, stumps or other debris. All affected roadways shall be inspected, cleared, and opened to traffic within 1 hour of completed blasting or as required by governing authorities.
3. Complete all blasting with experienced powdermen licensed to use explosives in the State.
4. Conduct blasting at such hours so as not to disrupt surrounding residences and businesses, and in accordance with Federal, state and local regulations and/or ordinances with regard to noise.
5. Take all precautions necessary to warn and/or protect any individuals exposed to his operations prior to any blasting. Blasting mats or other approved flyrock protection shall be employed as necessary to protect areas adjacent to blasting.
6. Develop and maintain records covering pertinent data on the location, depth and area of the blast, the diameter, spacing, depth, overdepth, pattern, amount, distribution and powder factor for the explosives used per hole and per blast; the sequence and pattern delays, and description and purpose of special methods. Provide a copy of the records to the Owner upon the Owner's request. Receipt and acceptance by the Owner of blasting data will not relieve the Contractor of responsibility to produce satisfactory results as set forth in these specifications. Drilling and blasting shall be done only to the depth, amount and at such locations, with explosives of such quantity, distribution, and density that will not produce unsafe or damage rock surfaces or damage rock beyond the prescribed excavation limits. The Contractor shall be responsible for the cost of removal of overblast and also for the cost of placement and compaction of suitable replacement fill where overblast removal is required or occurs.
7. When a drilling and blasting program results in damage to the excavation or unacceptable peak particle velocity or frequency values as specified herein, the Contractor will be required to devise and employ revised methods that will prevent such damage or unacceptable ground motions at no cost to the Owner. The revisions may include special methods such as presplit and zone blasting, shallow lifts, reduction in size of individual blasts, small diameter blast holes, closely spaced blast holes, reduction of explosives, greater distribution of explosives by use of decking and primacord or variation in density of explosives and chemical or mechanical splitting of the rock.

#### B. Explosives

1. Take special precautions for proper use of explosives to prevent harm to human life and damage to surface structures, utility lines, or other subsurface structures.
2. Store, handle, and employ explosives in accordance with Federal, state and local regulations, or, in the absence of such, in accordance with the provisions of the NFPA and OSHA.

#### C. Blasting Vibration And Limit Criteria

1. The amount of vibration, frequency and overpressure generated by blasting shall not exceed regulatory statutes or directives established by State, local or other authorities. In no case shall the maximum Peak Particle Velocity (PPV) exceed the limits indicated on Figure B-1, Appendix B, of the United States Bureau of Mines Report of Investigations, RI 8507, 1980 or latest edition.
2. The peak airblast overpressure measured at the location of the nearest occupied, aboveground structure (considering wind direction) shall not exceed 0.014 psi.

#### D. Preblast Survey

1. General:

- a. Conduct a preblast survey prior to initiating blasting work. Preblast survey shall be performed by a registered Professional Engineer or specialized consultant licensed in the State of the work covered under this contract and specialized in conducting preblast surveys.
  - b. The preconstruction/preblast survey shall consist of documenting conditions of all existing dwellings and structures located within a minimum of 500 feet of the limits of all work requiring rock blasting prior to commencement of blasting or further if required by Federal, state or local regulations.
  - c. The purpose of the preblast survey is to determine the conditions of existing dwellings, structures and water supply wells and document any pre-existing defects and other physical factors that could reasonably be affected by the blasting. Structures such as dams, ponds, pipelines, cables and transmission lines, cisterns, structures of historical significance, and/or structures with unusually costly or vulnerable contents shall be included. The preblast survey shall also note the nature and sensitivity of livestock that may be affected by the blasting.
2. Examination of and Preparation for Survey:
  - a. The Contractor shall contact the property owners (or their legal representative) of properties within a minimum of 500 feet of the limits of all blasting work in order to obtain permission to conduct a survey of their property. If the property owner does not grant the Contractor permission to conduct the survey, the Contractor shall contact the property owner a second time by registered mail/return receipt requested. The second request for permission to conduct the survey shall include a description of the survey to be performed and the purpose of the survey. At least 72 hours prior to start of blasting work, notify the appropriate local regulatory authority of any property owners who refuse access for the preconstruction survey.
  - b. Notify the property owners at least 48 hours prior to conducting the preblast survey. After completion of the survey, two copies of the preblast report shall be submitted to the appropriate local regulatory authority for their reference if required. Additionally, one copy shall be kept on file at the location of the project and one copy provided to the Owner upon request.
3. Method:
  - a. The preblast survey shall include a detailed examination of the interior and exterior of structures located within a minimum of 500 feet of the limits of blasting work. Color photographs, videotapes, and written descriptions shall be taken as required to document the condition of areas within the limits of the survey area. Particular note shall be made of evident structural faults or deficiencies, or recent repairs.
  - b. The preblast survey shall also include an assessment of water supply wells located within a minimum 500 feet of the limits of all blasting work. This assessment shall include the following items:
    - 1) Information regarding the date of construction of the well, depth, method of construction, yield, water quality and any other existing available data will be requested from each well owner and/or the installer, provided the installer is known.
    - 2) A short duration pump test shall be performed on each well utilizing the existing pump that services each well. The pump shall be activated, the volume of water measured and the drawdown in the well measured for a 1-hour or less period until approximate steady state conditions are achieved. The data obtained from these measurements shall be used to estimate the approximate yield of each well.
    - 3) Upon completion of the above-described short duration pump test, obtain a groundwater sample from the well and submit to a State certified water quality laboratory. Laboratory shall analyze sample for iron, manganese, total dissolved solids, turbidity and total coliform.
4. Survey Report:
  - a. The Contractor shall prepare a written report summarizing the results of the preblast survey. The final written report shall be signed and sealed by the Contractor's qualified inspector. The report shall contain the following:
    - 1) Location and description of each property
    - 2) Descriptions of the conditions of the on-site elements
    - 3) Summary of the visual inspection
    - 4) Color photographs, sketches, and videotape with vocal summary
    - 5) All data developed from the water supply well assessment
  - b. Provide videotapes to include supplemental information, as required. Pictorial documentation shall be of professional quality and shall be provided with a scale, where practicable. Clearly label pictorial documentation with an identification number, name of the project and the Engineer or qualified

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person conducting the survey, name of the property owner, date the picture or video tape was taken, and sufficient information to determine the location of the area in question.

- c. The Contractor's inspector shall immediately report in writing to the Contractor any findings that, in his opinion, indicate that any structure or well will be adversely affected by the required construction and blasting.
- d. If, during the course of construction and blasting, the Contractor is requested by an adjacent property owner to view alleged damage to property, the Contractor shall give written notice to the Owner prior to the Contractor's visit to the adjacent owners property.

E. Blast Monitoring:

1. Contractor shall perform seismic blast monitoring in accordance with State and local regulations.
2. Contractor shall provide monitoring of blasting vibrations and over-pressures to allow evaluation of compliance with the specified vibration/over-pressures to criteria. As a minimum, the Contractor will monitor each blast as follows:
  - a. Monitor vibrations at the exterior walls of all structures within 500 feet of each blast location.
  - b. If no structures are located within 500 feet of the blast location, monitor vibrations at three equally spaced radial points located a minimum of 500 feet from the blast locations.
  - c. Monitor over-pressures for all structures within a minimum 500 feet of the blast.
3. If requested by the Owner, report vibration/overpressure-monitoring results to the Owner within two hours of blasting. Monitoring performed by the Contractor does not relieve the Contractor of responsibility for control of vibration and overpressure during blasting operations.

3.4 ROCK CUT FACE EXCAVATION

- A. The slope of the soil above the top of any permanently exposed rock cut face shall be no steeper than 3(H):1(V) unless otherwise noted on the Construction Drawings. Slope of the rock face shall meet the requirements below.

TYPE OF ROCK

SLOPE (Horizontal to Vertical)

Solid limestone or sandstone

1:1.2

Interbedded limestone, sandstone or shale

1:1.25

Layered shale (no hard rock)

1:1.5

- B. Benches of at least ten feet in width at a maximum of twenty feet in elevation intervals or as noted on the Construction Drawings. The benches shall serve to provide rock traps and divert water from the rock face.

3.5 ROCK TRAP

- A. Locate rock traps at the base of permanently exposed rock slopes and construct as indicated in the Construction Documents or Blasting Plan.

3.6 OVEREXCAVATION AND BACKFILL

- A. Over excavation which is required to remove unsuitable natural undisturbed bedrock weakened by weathering or other cause not inflicted by the Contractor shall be immediately reported to the Owner and performed as directed by the Owner, and the theoretical lines and grades will be adjusted accordingly. Material outside the excavation limits which are disturbed due to the fault or negligence of the Contractor or due to his failure to exercise sound construction practices, shall be either replaced by the Contractor with suitable materials (earth or concrete), or bolted, or both as directed, at no cost to the Owner.

END OF SECTION

## SECTION 02340 - SOIL STABILIZATION

### PART 1 GENERAL

#### 1.1 SUMMARY

It is anticipated that areas of the site will require subgrade stabilization. These areas are to be identified in the field by proving methods such as proof rolling, as further described in Section 02300 – Earthwork. Areas that do not exhibit the necessary stability are required to be stabilized as needed to provide adequate support for the intended improvements. Approved options for stabilizing these areas are presented herein. The means and methods, as well as the implementation of the stabilization, are the responsibility of the contractor. Opinions given by the Engineer or the Owner's CTL regarding the Contractor's stabilization method do not constitute an approval for the method of the stabilization. If the initial method selected by the contractor does not produce an acceptable subgrade for the subsequent improvements, it shall be the contractor's responsibility to modify and/or replace the original method as may be needed to achieve an acceptable result. Costs for all subgrade stabilization, including both initial and subsequent repairs as may be needed, are to be included in the base bid and no additional compensation will be provided.

- A. Section Includes:
  - 1. Excavation, treatment, and backfilling of subgrade for lime, cement, fly ash, or bridge lift stabilization.
  - 2. Geotextile fabric and geogrid for stabilization of subgrade.
- B. Related Requirements:
  - 1. Section 02300 – Earthwork

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM):
  - 1. ASTM C150 - Portland Cement.
  - 2. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.
  - 3. ASTM C977 - Quicklime and Hydrated Lime for Soil Stabilization.
- C. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO M216 - Lime for Soil Stabilization.
- D. National Lime Association (NLA):
  - 1. NLA Bulletin 326 - Lime Stabilization Construction Manual.
- E. Oklahoma Department of Transportation (ODOT):
  - 1. Standard Specifications for Highway Construction, 2019 Edition.
- F. Occupational Safety and Health Administration (OSHA):
  - 1. OSHA 01926.1153 Respirable Crystalline Silica.

#### 1.3 ENVIRONMENTAL REQUIREMENTS

- A. Do not install mixed materials in wind in excess of 10 mph or when temperature is below 40 degrees Fahrenheit.

#### 1.4 SUBMITTALS

- A. Submit 30-pound sample of each material to be used at the site in airtight containers to the Construction Testing Laboratory (CTL) or submit gradation and certification of material that is to be used to the CTL for review.
- B. Submit name of each materials supplier and specific type and source of each material. Obtain approval of Owner prior to change in source.
- C. Submit mix designs, materials mix ratio, detailed descriptions of the proposed procedures and equipment to be used, documentation of projects successfully completed within the last five (5) years and laboratory test data to the Engineer 4 weeks prior to beginning stabilization activities. Certify materials and mix ratios will achieve the specified requirements as indicated in the Construction Documents or as specified by state and local agencies for soil stabilization if not stated in the Construction Documents.
- D. Submit approved mix designs, materials mix ratio, and laboratory test data to the CTL prior to commencing stabilization activities.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Provide products from one of the following manufacturers as specified in the Materials paragraph below:
  1. TenCate Geosynthetics North America (Mirafi), Pendergrass, GA., (706) 693-2226, [www.tencate.com](http://www.tencate.com)
  2. Hanes Geo Components (WEBTEC), Winston Salem, NC. (336) 747-1600, [www.hanesgeo.com](http://www.hanesgeo.com)
  3. Tensar International Corp., Atlanta, GA. (888) 828-5126, [www.tensarcorp.com](http://www.tensarcorp.com)
  4. Thrace-LINQ Inc., Summerville, SC (843) 873-5800, [www.thracelinq.com](http://www.thracelinq.com)
  5. DuPont (Tygar). Summerville, SC (843) 832-6860, [www.tygargeo.com](http://www.tygargeo.com)
  6. Syntee Technical Fabrics, Lancaster, SC (800) 796-8336, [www.syntee.com](http://www.syntee.com)

### 2.2 MATERIALS

- A. Soil Treatment Materials:
  1. Hydrated Lime: ASTM C977 or AASHTO M216.
  2. Portland Cement: ASTM C150, Type I.
  3. Fly Ash: ASTM C618.
- B. Aggregate:
  1. Coarse Aggregate: Crushed carbonate, crushed gravel, crushed air-cooled slag, granulated slag, a mixture of crushed and granulated slag, or other types of suitable material meeting the following gradation requirements:

Sieve Size	Percent Passing
2 inches	100
1 inch	70-100
3/4 inch	50-90
No. 4	30-60
No. 30	7-30
No. 200	0-5

2. Fine Aggregate: Sand – Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter meeting the following gradation requirements:

Sieve Size	Percent Passing
No. 4	90-100
No. 50	7-40
No. 200	0-5

- C. Subsoil: Existing to be reused.

- D. Bridge Lift Material: Surge stone, granular fill, or shot rock fill.

## 2.3 ACCESSORIES

- A. Curing Seal: Asphalt Emulsion Primer.
- B. Geotextile Fabric for Stabilization: Provide one of the following:
  - 1. Mirafi HP 370 or HP 570, by TenCate.
  - 2. SF40 or SF65, by DuPont.
  - 3. GTF-200 or 300, by Thrace-LINQ.
  - 4. TerraTex HD, by Hanes.
- C. Geogrid for Stabilization: Provide one of the following:
  - 1. Biaxial Geogrid Type 1 (formerly BX 1100), by Tensar.
  - 2. Biaxial Geogrid Type 2 (formerly BX 1200), by Tensar.
  - 3. Mirafi BXG 11, by TenCate.
  - 4. Mirafi BXG 12, by TenCate.
  - 5. SF 11, by Synteen.
  - 6. SF 12, by Synteen

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Obtain approval of mix design before proceeding with placement.
- B. Start stabilization only when weather and soil conditions are favorable for successful application of proposed material.
- C. Proofroll subgrade to identify areas in need of stabilization.
- D. Contractor shall assume all responsibility for proper mix design. Contractor shall perform necessary soil tests to confirm soluble sulfates are not present within soil matrix prior to using any material containing calcium due to possibility of sulfate induced heave. If a product containing calcium is utilized and soil heave issues arise either during or after construction it shall be the responsibility of the Contractor to remediate affected areas in accordance with the owner's requirements.

### 3.2 EQUIPMENT

- A. Perform operations using suitable, well maintained equipment capable of excavating subsoil, mixing and placing materials, wetting, consolidating, and compacting of material.

### 3.3 EXCAVATION

- A. Excavate subsoil to depth sufficient to accommodate soil stabilization.
- B. Remove lumped subsoil, boulders, and rock that interfere with achieving uniform subsoil conditions.
- C. Do not excavate within normal 45 degree bearing splay of any foundation.
- D. Notify Construction Manager of unexpected subsurface conditions. Discontinue affected work in area until notified to resume work.
- E. Correct areas over-excavated in accordance with Section 02300.

- F. Remove excess excavated material from site.

#### 3.4 GEOTEXTILE FABRIC AND/OR GEOGRID

- A. Place geotextile fabric and/or geogrid over subsoil surface, lap edges and ends in accordance with manufacturer's recommendations in those areas that are shown on Construction Drawings or in those areas that need additional stabilization prior to placement of base course. Bridge lift sections may require the use of geotextile fabric and/or geogrid for stabilization prior to placement of fill.
- B. Place geotextile fabric and/or geogrid in accordance with manufacturer's recommendations.

#### 3.5 SOIL TREATMENT AND BACKFILLING

- A. Lime Stabilized Subgrade: Where indicated on Construction Drawings or as required after continual failure, treat prepared subgrade with hydrated lime in accordance with state highway department specifications.
- B. Cement Stabilized Subgrade: Where indicated on Construction Drawings or as required after continual failure, treat prepared subgrade with Portland cement in accordance with state highway department specifications.
- C. Fly Ash Stabilized Subgrade: Where indicated on Construction Drawings or as required after continual failure, treat prepared subgrade with fly ash in accordance with state highway department specifications.
- D. Bridge Lifts: Where indicated on Construction Drawings or as required after continual failure, treat prepared subgrade by application of a bridge lift. Bridging over existing soils shall be acceptable only when approved in writing by the Owner. Place geotextile fabric or geogrid over existing soils to be bridged. The geotextile fabric or geogrid selected shall be appropriate for the bridge lift material being placed. Place bridge lift over geotextile fabric or geogrid. Surge stone and shot rock will be approved by the Owner's representative on a submittal basis. The Owner and the Owner's representative shall have sole discretion as to the acceptability of all submittals. Bridge lifts within the building pad area will not be accepted.
- E. Backfill and compaction of treated subsoil shall be in accordance with Sections 02300.
- F. Maintain optimum moisture of mixed materials to attain required stabilization and compaction.
- G. Finish subgrade surface in accordance with Section 02300.
- H. Remove surplus mix materials from site.

#### 3.6 CURING

- A. Immediately following compaction of mix, seal top surface with curing seal.
- B. Do not permit traffic for 72 hours after sealing top surface.

#### 3.7 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor as necessary to assure compliance with Contract requirements.

END OF SECTION

## SECTION 02370 – EROSION AND SEDIMENTATION CONTROL (INCLUDING SWPPP)

### PART 1 – GENERAL

#### 1.1 SUMMARY

- A. Section Includes
  - 1. Installation of temporary and permanent erosion and sedimentation control systems.
  - 2. Installation of temporary and permanent slope protection systems.
  - 3. Stormwater Pollution Prevention Plan (SWPPP).
- B. Related Sections
  - 1. Stormwater Pollution Prevention Plan
  - 2. Construction Drawings (“Site Maps”)
  - 3. Construction Stormwater Details

#### 1.2 ENVIRONMENTAL REQUIREMENTS

- A. Protect adjacent properties, any identified endangered or threatened species and/or critical habitat, any identified cultural or historic resources, and receiving water resources from erosion and sediment damage until final stabilization is achieved. All stormwater controls and systems must be installed & functioning as designed and free of accumulated sediment and debris before final project approval.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Seed, sod, and ground covers for the establishment of vegetation.
- B. All erosion control products sediment control devices or materials for non-stormwater BMPs as specified herein and on the Construction Drawings.
- C. Rolled erosion control products according to Erosion Control Technology Council (ECTC) standard specifications.
- D. Temporary mulches such as loose straw, wood cellulose, or agricultural silage.
- E. Rip-Rap (stone protection).
- F. Temporary and permanent outfall structures as specified on the drawings.

### PART 3 – EXECUTION

#### 3.1 PREPARATION

- A. Review the drawings and Stormwater Pollution Prevention Plan.
- B. Conduct stormwater pre-construction meeting with Site Contractor, all ground-disturbing Sub-contractors, and state or local agency personnel.
- C. Revise SWPPP as necessary to address potential pollution from site identified after issuance of the SWPPP at no additional cost to owner.

#### 3.2 EROSION AND SEDIMENTATION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Place erosion and sediment control systems in accordance with the drawings and Stormwater Pollution Prevention Plan or as may be dictated by site conditions in order to maintain the intent of the specifications and permits.
- B. The Stormwater Pollution Prevention Plan and Site Maps shall be corrected or modified as site conditions change. Contractor must obtain approval from Developer's Engineer prior to modifying or substituting Best Management Practices. Changes during construction shall be noted in the Stormwater Pollution Prevention Plan and posted on the drawings (Site Maps).
- C. Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures.
- D. Maintain erosion and sedimentation control systems as dictated by site conditions, indicated in the construction documents, or as directed by governing authorities or Owner to control sediment until final stabilization. Contractor shall respond to maintenance or additional work ordered by Owner or governing authorities immediately, but in no case, within not more than 48 hours at no additional cost to the Owner.
- E. Contractor shall incorporate permanent erosion control features, paving, permanent slope stabilization, and vegetation into project at earliest practical time to minimize need for temporary controls.
- F. Permanently seed and mulch cut and fill slopes as construction proceeds to extent considered desirable and practical.
- G. Unless required within a shorter timeframe by the applicable General Permit for Stormwater Discharges Associated with Construction Activity, disturbed areas that will not be graded or actively worked for a period of 14 days or more (7 days or more for steep slopes as defined in the General Permit), shall be temporarily stabilized as work progresses with vegetation or other acceptable means unless otherwise specified in the Contract Documents. In the event it is not practical to seed areas, slopes must be stabilized with mulch and tackifier, bonded fiber matrix, netting, blankets or other means to reduce the erosive potential of the area.

END OF SECTION

**STORMWATER POLLUTION PREVENTION PLAN**  
**FOR**

**CONSTRUCTION ACTIVITIES**

**AT**

**Coweta Trails II Senior Apartments**  
**Coweta, Oklahoma**

Prepared for:

Capstone at Coweta Trails II, LLC  
3556 S. Clu Pepper Circle, Suite 4  
Springfield, MO 65908

Prepared by:

Carlson Consulting Engineers, Inc.  
7068 LedgeStone Commons  
Bartlett, TN 38133  
Phone: (901) 384-0404  
Fax: (901) 384-0710

NWC – East 121<sup>st</sup> Street S. and S 273<sup>rd</sup> E Avenue  
Coweta, OK

**Engineer's Certification of the  
Stormwater Pollution Prevention Plan**

**General Permit for Stormwater Discharges  
from Construction Activities**

Per section 6.7.4 of the General Permit:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,



Joseph Parsley, PE

Vice President, Carlson Consulting Engineers

PE-22955

## SECTION 02370 – EROSION AND SEDIMENTATION CONTROL (INCLUDING SWPPP)

### I. INTRODUCTION

This SWPPP has been prepared for major activities associated with the construction of:

#### Coweta Trails II Senior Apartments

This SWPPP, including the applicable General Permit, includes the elements necessary to comply with the General Permit for construction activities administered by the U.S. Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES) program and all local governing agency requirements. This SWPPP must be implemented at the start of construction.

Construction phase pollutant sources anticipated at the site are disturbed (bare) soil, vehicle fuels and lubricants, chemicals and coatings associated with site or building construction and pavement installation, construction-generated litter and debris, and building materials. Without adequate control there is a potential for each type of pollutant to be transported by stormwater.

Building size: 57,438 sq ft  
Total project area: 3.42 Acres  
On-site disturbed area: 3.42 Acres  
Off-site disturbed area: 1.08 Acres  
Total disturbed area: 4.50 Acres

Project construction will consist primarily of demolition, site grading, paving, storm drainage, water supply, sewage collection, road work, utilities, site lighting, etc. located within the permitted project area.

#### A. Purpose

A major goal of pollution prevention efforts during project construction is to control soil and pollutants that originate on the site and prevent them from flowing to surface waters. The purpose of this SWPPP is to provide guidelines for achieving that goal. A successful pollution prevention program also relies upon careful inspection and adjustments during the construction process in order to enhance its effectiveness.

#### B. Scope

This SWPPP must be implemented before construction begins on the site. It primarily addresses the impact of storm rainfall and runoff on areas of the ground surface disturbed during the construction process. In addition, there are recommendations for controlling other sources of pollution that could accompany the major construction activities. Applicability of this SWPPP will terminate when disturbed areas are stabilized, permanent erosion and sedimentation controls are installed, temporary erosion and sedimentation controls are removed, construction activities covered herein have ceased, and a completed Notice of Termination (NOT) is transmitted to the governing agency.

Forms which are necessary for implementing the SWPPP are included herein.

The General Permit for Stormwater Discharges Associated with Construction Activities prohibits most non-stormwater discharges during the construction phase. Allowable non-stormwater discharges that occur during construction on this project, which are covered by the General Permit in section 2.2.B.1-11, include:

1. potable water, including uncontaminated waterline and fire hydrant flushing.
2. landscape irrigation water provided all pesticides, herbicides, and fertilizers have been applied in accordance with the approved manufacturers' instructions and/or labeling.
3. water used to control dust.
4. uncontaminated air conditioning or compressor condensate.
5. uncontaminated groundwater or spring water.
6. waters used to wash vehicles and equipment where soaps, solvents or detergents are not used.
7. routine external building wash-down that does not use soaps, solvents and/or detergents and/or building wash-down from external surfaces that does not contain leachable

hazardous substances (e.g., paint or caulk containing polychlorinated biphenyls ("PCBs"))).

8. pavement washing waters provided spills or leaks of toxic or hazardous substances have not occurred (unless all spilled material has been removed) and where soaps, solvents and detergents are not used.
9. foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water.
10. discharges or flows from emergency firefighting activities that either: a) do not involve per- and polyfluoroalkyl substances (PFAS)-containing aquatic firefighting foams (AFFFs), or b) involve PFAS-containing AFFFs and are consistent with Part 4.4.F of this permit. Measures shall be taken by the permittee or site/facility, as soon as practicable, to reduce any such pollutant releases to avoid or minimize the impacts on water quality and to ensure public health and safety. After the emergency has ceased, non-stormwater discharges (e.g., discharges associated with clean-up) are prohibited. Determination of cessation of the emergency is at the discretion of the emergency on-site coordinator.
11. uncontaminated flows from dewatering activities, including dewatering of trenches and excavations, will be allowed if operational and structural controls are used to reduce any pollutant releases to avoid or minimize the impacts on water quality (see Part 4.2.M). These controls must be included in your SWP3.

The above non-stormwater discharges from active construction sites are authorized by the general permit provided the non-stormwater component of the discharge is in compliance with section 2.2.B.1-11 of the Oklahoma OPDES General Permit.

Best Management Practices (BMPs) must be implemented for the above allowable discharges for the duration of the permit. Each non-stormwater discharge should be noted in the SWPPP and have proper erosion and sedimentation controls in place with the possible exception of discharges from fire fighting activities.

The techniques described in this SWPPP focus on providing control of pollutant discharges with practical approaches that utilize readily available expertise, material, and equipment.

The Owner referred to in this SWPPP is Capstone at Coweta Trails II, LP. The General Contractor shall construct the site development improvements while working under contract with the Developer

#### **C. Stormwater Team**

Operator/Developer:

Joseph Ryan Hamilton  
Manager of its General Partner  
Capstone at Coweta Trails II, LP  
3556 S. Clupepper Circle, Suite 4  
Springfield, MO 65804

Engineer:

Joseph Parsley, PE  
Carlson Consulting Engineers, Inc.  
7068 Ledgestone Commons  
Bartlett, TN 38133  
(901) 384-0404

## II. PROJECT DESCRIPTION

Described below are the major construction activities that are the subject of this SWPPP. Also included in the sequence are BMP installation activities that must take place prior to construction activities. **NOTE: Down slope protective measures must always be in place before soil is disturbed.** Activities are presented in the order (sequence) they are expected to be completed.

All activities and timeframes (beginning and ending dates) shall be noted on the Site Map. The sequence of construction is as follows:

NOTE: Upon implementation and installation of the following areas: trailer, parking, lay down, porta-potty, wheel wash, concrete washout, mason's area, fuel and material storage containers, solid waste containers, etc., immediately denote them on the Site Maps and note any changes in location as they occur throughout the construction process. In addition, note all areas where fill is imported from or soil is exported to on the Site Maps.

### PHASE I - EROSION CONTROL SEQUENCING

1. INSTALL STONE CONSTRUCTION EXIT AND SWPPP INFORMATION SIGN.
2. INSTALL SILT FENCE AND CHECK DAM IN ALL AREAS SHOWN. SILT FENCE MUST BE IN PLACE PRIOR TO SUBGRADE DISTURBING ACTIVITIES.
3. PREPARE CONTRACTOR TEMPORARY STAGING AND STORAGE AREA.
4. SEQUENCE GRADING ACTIVITIES TO MINIMIZE EXPOSED AREAS.
5. BEGIN GRADING ACTIVITIES IN BUILDING AREA AND ADJACENT PAVEMENT AREAS.
6. BEGIN PLACEMENT OF STRUCTURAL FILL IN BUILDING AREAS AND ADJACENT PAVEMENT AREAS.

### PHASE II - EROSION CONTROL SEQUENCING

1. TEMPORARILY STABILIZE, THROUGHOUT CONSTRUCTION, DENUDED AREAS THAT WILL BE INACTIVE FOR 14 DAYS OR MORE. ALL AREAS AT FINAL GRADE MUST BE PAVED OR STABILIZED WITH SPECIFIED GROUND COVER PER LANDSCAPE PLAN WITHIN 14 DAYS AFTER COMPLETION OF WORK IN THESE AREAS.
2. INSTALL, REPLACE, REPAIR, OR MAINTAIN INLET PROTECTION, SILT FENCE, TEMPORARY CONSTRUCTION FENCE, STONE CONSTRUCTION EXIT, CHECK DAMS, AND SWPPP INFORMATION SIGN AS NEEDED.
3. PREPARE/MAINTAIN TEMPORARY STAGING AND STORAGE AREA AS NEEDED.
4. BEGIN INSTALLATION OF STORMWATER PIPES WITH INLET PROTECTION AS SOON AS POSSIBLE FOR USE AS SEDIMENT TRAPS.
5. COMPLETE ALL OTHER GRADING ACTIVITIES AT THIS TIME.
6. IMMEDIATELY INSTALL PERMANENT GROUND COVER, FERTILIZE, MULCH, AND WATER AREAS IN ACCORDANCE WITH THE PLANTING PLAN AND SITEWORK SPECIFICATIONS.
7. CONTINUE INSPECTION REQUIREMENTS UNTIL FINAL STABILIZATION HAS BEEN OBTAINED AND THE NOTICE OF TERMINATION HAS BEEN FILED AND APPROVED.

### III. SITE DESCRIPTION

Included as parts of this SWPPP are the project Construction Drawings. Refer to the Construction Drawings for detailed site information.

#### A. Site Location

- Address: NWC – East 121<sup>st</sup> Street S. and S 273<sup>rd</sup> E Avenue, Coweta, OK
- Latitude: 35°59'27" N (35.990833°)
- Longitude: 95°40'28" W (-95.674444°)
- Legal Description: The legal description is included in Appendix A
- A vicinity map is included in Appendix B.

#### B. Site Topography

- Lowest elevation on project site: 659'
- Highest elevation on project site: 664'
- Percent slope variation: The site slopes generally slopes from west to east and then south to north. Steepest grades are 50% with some areas as flat as 0.7%.
- Topography changes: Site will drain via storm sewer to a proposed detention basin. This basin will discharge to ditch which will be connected to a channel to the north. Generally, there is a 5' elevation change from the west property line to the east property line.
- Vegetation: The site currently consists of grass with a few trees.

#### C. Site Soils

- Soil type and texture: Okemah Silt loam - 0% to 1% slopes and Dennis-Radley Complex – 0 to 15% slopes based on USDA soil surveys
- Average depth of topsoil: Per the project Geotechnical report, average topsoil depth is 6"
- Average depth to ground water: Per the project Geotechnical report, groundwater was not encountered in any of the borings.

#### D. Total Site Area, Area to be Disturbed, and Runoff Coefficient

- The project site contains: 3.42 Acres  
The area to be disturbed on the project site is: 3.42 Acres
- Pre-Construction Runoff Coefficient: CN= 74
- Post-Construction Runoff Coefficient: CN=83

#### E. Receiving Surface Waters

- Receiving waters: An intermittent stream discharges the storm water to Coweta Creek and ultimately discharge to the Arkansas River.
- Distance to named receiving waters: 0.01 miles to the east
- Receiving water quality: Coweta Creek is not listed on the State of Oklahoma 303(d) list of impaired waters.

#### F. Wetlands

- According to the National Wetlands Inventory, there are no wetlands in the vicinity of the project site.

#### G. Endangered Species

- Refer to Appendix D for list of endangered species in the county.

#### H. Historical Properties

- The site does not contain any historic properties, nor does it lie within any registered historic district.

### IV. STORMWATER POLLUTION PREVENTION MEASURES AND CONTROLS

A variety of stormwater pollutant controls are recommended for this project. Some controls are intended to function temporarily and will be used as needed for pollutant control during the construction period. These include temporary sediment barriers and permanent storm retention ponds (which can also function as temporary sediment

basins). Permanent stabilization will be accomplished in all disturbed areas by covering the soil with pavement, building foundation, vegetation, or other forms of soil stabilization.

**A. Erosion and Sediment Controls**

**1. Minimization of Disturbed Areas**

**Note to General Contractor:** Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct General Contractor to provide immediate permanent or temporary pollution control measures

**2. Soil Stabilization**

The purpose of soil stabilization is to prevent soil from eroding and leaving the site. In the natural condition, soil is stabilized by native vegetation. The primary technique to be used at this project for stabilizing site soils will be to provide a protective cover of grass, pavement, or building structure.

- a.) **Temporary Seeding or Stabilization** – All denuded areas that will be inactive for 14 days or more, must be stabilized temporarily with the use of fast-germinating annual grass/grain varieties appropriate for site soil and climate conditions, straw/hay mulch, wood cellulose fibers, tackifiers, netting and/or blankets, Stockpiles and diversion ditches/berms must be stabilized to prevent erosion and dust issues.

**Note to General Contractor:** Temporary stabilization is not achieved simply through seeding. In order for an area or stockpile to be sufficiently stabilized via temporary vegetation, seed must germinate, grow and provide adequate vegetative density.

- b.) **Permanent Seeding, Sod or Mulching** – All areas at final grade must be covered with sod 14 days after completion of work in that area. At the completion of ground-disturbing activities the entire site must have permanent vegetative cover, meeting vegetative density requirements, or mulch per landscape plan, in all areas not covered by hardscape (pavement, buildings, etc.). Consideration is given to climate conditions, soil type and native vegetation when designing the final landscaping plan. Note: Crushed/decomposed granite or other non-vegetative cover may be an acceptable final cover in arid climates.

To minimize the potential for erosion and maximize seed germination & growth, the General Contractor must evaluate the short and long-term local forecast prior to applying permanent seed or sod.

**3. Structural Controls**

Stormwater run-off for this project will be handled by the use of structural controls such as inlet filters, sedimentation/erosion control eels. Locations for and details of structural controls can be found on the sheets titled Erosion and Sedimentation Control Plan/Site Map – Phases I through II, and Erosion Control Details. In case there are questions regarding stormwater run-off, the Contractor shall refer to the General Permit for requirements.

- a) **Sedimentation Basins** – Temporary sedimentation basins are depressions constructed downslope of construction activity and located such that stormwater runoff from upland areas of less than 100 acres are diverted through the basin. Sediment basins shall be constructed as directed by the SWPPP and shall be constructed as part of the initial Phase I BMPs whenever practical. An overflow pipe is incorporated at the outlet to discharge flow from the basin. Temporary and/or permanent discharge devices for use in sedimentation basins shall be constructed with fill placement to endure these devices are properly placed and the surrounding backfill is adequately tied to the basin levee. All materials in the levee, including bedding materials for the discharge devices, shall be low

permeability, cohesive soil. Soil exhibiting high shrink/swell potential or containing greater than 5% organics shall not be used. A marker signifying the need for cleanout of each basin must be provided at the elevation shown on the Erosion Control Details provided in the Site Development Plans for this project. **This control is not specified at this time**

- b) **Sedimentation Traps** – Temporary sedimentation traps are depressions constructed down slope of construction activity and located such that stormwater runoff from upland areas of less than 5 acres are diverted through the trap. Sedimentation traps shall be constructed as indicated by the SWPPP and shall be constructed as part of the initial BMPs whenever practical. An overflow weir is incorporated at the outlet to discharge flow from the trap. Sedimentation traps shall be phased with the earthwork activity where practical. **This control is not specified at this time**
- c) **Silt Fence** – Silt fence is a synthetic permeable woven or non-woven geotextile fabric incorporating metal support stakes at intervals sufficient to support the fence (5-feet maximum distance between posts), water, and sediment retained by the fence. The fence is designed to retain sediment-laden stormwater and allow settlement of suspended soils before the stormwater flows through the fabric and discharges from the site. Silt fence shall be located on the contour to capture overland, low-velocity sheet flows and is typically installed with a wire fence backing for additional support. Wire fence backing is required unless the silt fence is installed using the slicing method as the slicing method ensures the silt fence fabric is anchored securely in the ground.

Install silt fence at a fairly level grade along the contour with the ends curved uphill to provide sufficient upstream storage volume for the anticipated runoff. Drainage areas shall not exceed ½ acre per 100 feet of wire-reinforced silt fence for slopes less than 2 percent.

- d) **Construction Exit** – All access points from the public street into the construction site shall include a construction exit composed of course stone to the dimensions shown on the Construction Drawings detail sheet. The rough texture of the stone helps to remove clumps of soil adhering to the construction vehicle tires through the action of vibration and jarring over the rough surface and the friction of the stone matrix against soils attached to vehicle tires.

In addition to the stone at the construction exit, it may be necessary to install devices such as pipes (cattle guard) to increase the vibration and jarring. It may also be necessary to install a wheel wash system. If this is done, a sedimentation trap control must be installed to treat the wash water before it discharges from the site.

All site access must be confined to the construction exit(s). Barricade to prevent use, any locations other than the construction exit(s) where vehicles or equipment may access the site. Use jersey barriers, construction fencing/drums, etc. near construction exit(s) to prevent traffic by-pass or short circuiting.

- e) **Storm Sewer Inlet Protection** – Curb and grated inlets are protected from the intrusion of sediment through a variety of measures as shown on the details included in the Construction drawings. The primary mechanism is to place controls in the path of flow sufficient to slow the sediment-laden water to allow settlement of suspended soils before discharging into the storm sewer. It is possible that as construction progresses from storm sewer installation through to paving that the inlet protection devices will change.

**Note to General Contractor:** All inlet protection devices create ponding of stormwater that can result in flooding or by-pass conditions.

- f) **Check Dams** – Defined channels subject to concentrated flows in larger quantities and higher velocities may be protected with rock or other manufactured device (Geo-ridge for example) that can be used as a check dam. The dams impound sediment-laden water and

allow for settlement of suspended soil before the stormwater flows over and through the device. Dams shall be placed along the water course at linear intervals in which the elevation of the bottom of the upper most check dam is at the same elevation as the top of the check dam immediately below it. This will allow the most ponding capacity and will not increase the velocity of the water flowing along the channel.

Location and spacing of check dams are shown on the Site Maps. Check dams are composed of crushed stone or rip rap or of other manufactured devices. See the detail sheet within the Construction Drawings for the types of dams to be used on this site.

- g) **Diversion Ditch/Berm** – Diversion ditches (swales) and berms (dikes) are constructed as shown on the Site Maps at locations within the construction site to intercept overland flow and direct or divert flow to a sediment basin or other point where discharge can be controlled. Ditches are excavated in the surface soils with the spoils from the excavation typically placed along the downstream edge of the ditch to provide additional capacity. Berms are built up on the surface soils and compacted to create a stable diversion. **This control is not specified at this time.**
- h) **Silt Dike on Pavement** - Silt Dikes are installed at locations within the construction site as shown on the Site Maps. The silt dikes are attached to the existing pavement surface and are used to impound sediment-laden water and allow for settlement of suspended soil before the stormwater flows over and through the device. **This control is not specified at this time.**
- i) **Erosion Eels** – Erosion Eels are to be installed at locations within the construction site as shown on the Site Maps. The erosion eels are placed on existing pavement surface and are used to impound sediment laden water and allow for settlement of suspended soil before the stormwater flows over and through the device.

## B. Other Pollutant Controls

This section includes the controls of pollutants other than sediment and additional requirements of the General Permit. In general, litter, construction debris, and construction chemicals exposed to stormwater shall be picked up prior to anticipated storm events or before being carried off of the site by wind (e.g., forecasted by local weather reports), or otherwise prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, daily pickup, etc.).

### 1. Dust Control

Construction traffic must enter and exit the site at the stabilized construction exit. The purpose is to trap dust and mud that would otherwise be carried beyond the permitted project area by construction traffic. Large areas of soil that are denuded of vegetation and have no protection from particles being picked up and carried by wind should be protected with a temporary cover or kept under control with water or other soil adhering products to limit wind transported particles exiting the site perimeter.

Water trucks or other dust control agents will be used as needed during construction to minimize dust generated on the site. Tackifiers may be used to hold soil in place and prevent dust. Manufacturer recommendations for application locations and rates must be used for dust control applications. Dust control must be provided by the General Contractor to a degree that is in compliance with applicable local and state dust control regulations.

### 2. Dewatering

Verify discharges from dewatering activities are allowed non-stormwater discharges under the General Permit. Obtain a dewatering permit according to state and local regulations, if discharges from dewatering activities are not allowed under the General Permit. Discharges from dewatering operations must be directed through an appropriate pollution prevention/treatment measure, such as a pump discharge filter bag, sediment trap or sediment basin prior to being discharged from the site or into a water body of the State. Under no circumstances are discharges from dewatering operations to be discharged directly into streams, rivers, lakes or other areas beyond the permitted project area. Likewise, discharges into storm sewer systems that do not drain to a suitable on-site

treatment facility, such as a basin, are also prohibited. Discharges from dewatering operations must also be conducted in a manner sufficient to prevent erosion from the discharge runoff.

Use best management practices when dewatering. Place intake hose on a flotation or similar device and do not pump directly from the bottom of the basin, trench, etc. Always pump through a sediment control BMP and dewater within the permitted limits of disturbance to ensure discharge criteria are achieved. Do not discharge on a slope greater than three percent or within 20' of a surface water body. Dewatering should not occur during or immediately after precipitation events, but exceptions will be evaluated on case by case basis.

**3. Solid Waste Disposal**

No solid materials, including building materials, are allowed to be discharged from the site with stormwater. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers will be emptied when 95% full, or as necessary, by a certified trash disposal service and hauled away from the site. Covers for the containers will be provided as necessary to meet state and local requirements. Construct covers as practicable, or required, to prevent stormwater contact and pollutant discharges from solid waste receptacles. The location of solid waste receptacles shall be shown on the Site Maps.

Substances that have the potential for polluting surface and/or groundwater must be controlled by whatever means necessary in order to ensure that they do not discharge from the site. As an example, special care must be exercised during equipment fueling and servicing operations. If a spill occurs, it must be contained and disposed of so that it will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of soil. In this regard, potentially polluting substances should be handled in a manner consistent with the impact they represent.

**4. Sanitary Facilities**

All personnel involved with construction activities must comply with state and local sanitary or septic system regulations. Temporary sanitary facilities will be provided at the site throughout the construction phase. They must be utilized by all construction personnel and will be serviced by a commercial operator. The location of sanitary facilities shall be shown on the Site Maps. Portable toilets must be securely anchored and are not allowed within 30' of inlets or permitted limit of disturbance or within 50' of a water of the State.

**5. Non-Stormwater Discharges**

Non-stormwater components of site discharges must be clean water. Water used for construction which discharges from the site must originate from a public water supply or private well approved by the State Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site. It can be retained in the ponds until it infiltrates and evaporates. Other non-stormwater discharges would include ground water. Only uncontaminated ground water can be discharged from the site, as allowed by and in accordance with applicable local ground water dewatering permits/regulations. When non-stormwater is discharged from the site, it must be done in a manner such that it does not cause erosion of the soil during discharge.

Process water such as power washing and concrete cutting must be collected for treatment and disposal. It is not to be flushed into the site storm drain system.

**6. Concrete Waste from Concrete Ready-Mix Trucks**

Discharge of excess or waste concrete and/or wash water from concrete trucks will be allowed on the construction site, but only in approved aboveground portable concrete washout containers (preferred) or in specifically designated lined and diked areas prepared to prevent contact between the concrete and/or wash water and stormwater that will be discharged from the site. The General Contractor shall eliminate or minimize the number of seams in the liner.

Alternatively, waste concrete can be placed into forms to make rip rap or other useful concrete products. The cured residue from the concrete washout diked areas shall be disposed in accordance with applicable state and federal regulations. This jobsite superintendent is

responsible for assuring that these procedures are followed. The location of concrete washout areas shall be shown on the Site Maps. Follow all applicable environmental regulations for concrete wash out pits.

The Oklahoma General permit Section 3.3.3 prohibits “wastewater from the washout of concrete, unless managed by an appropriate control as described in Part 3.3.3.B.4.” This includes directing all wash water into a leak-proof container or leak-proof pit, designed so that no overflows can occur due to inadequate sizing or precipitation; proper liquid waste disposal; and to locate any washout or cleanout activities as far away as possible from surface waters, stormwater inlets or conveyances, and, to the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas.

**7. Masons’ Area**

Contractor shall identify masons’ area on the site and indicate location on the Site Map. To the extent practical, all masonry tools, material, including sand and sacked cement or mortar materials, and equipment shall be located within the area identified. Runoff control, such as berms or diversion ditches, silt fence, straw wattles, or other means of containment shall be provided to prevent the migration of stormwater pollutants in runoff from the masons’ area. Receptacles for debris and trash disposal shall also be provided.

**8. Fuel Tanks**

Temporary on-site fuel tanks for construction vehicles shall meet all state and federal regulations. Tanks shall have approved spill containment with the capacity required by the applicable regulations. From NFPA 30: All tanks shall be provided with secondary containment (i.e. containment external to and separate from primary containment). Secondary containment shall be constructed of materials of sufficient thickness, density, and composition so as not to be structurally weakened as a result of contact with the fuel stored and capable of containing discharged fuel for a period of time equal to or longer than the maximum anticipated time sufficient to allow recovery of discharged fuel. It shall be capable of containing 110% of the volume of the primary tank if a single tank is used, or in the case of multiple tanks, 150% of the largest tank or 10% of the aggregate, whichever is larger.

The tanks shall be in sound condition free of rust or other damage which might compromise containment. Fuel storage areas will meet all EPA, OSHA and other regulatory requirements for signage, fire extinguisher, etc. Hoses, valves, fittings, caps, filler nozzles, and associated hardware shall be maintained in proper working condition at all times. The location of fuel tanks shall be shown on the Site Maps and shall be located to minimize exposure to weather and surface water drainage features.

A Spill Prevention, Control and Countermeasure (SPCC) Plan must be developed if aboveground oil storage *capacity* at the construction site exceeds 1,320-gallons or as specified by state. Containers with a storage capacity of 55-gallons or less are not included when calculating site storage capacity. The General Contractor shall work with the CEC to develop and implement a SPCC Plan in accordance with the Oil Pollution Prevention regulation at Title 40 of the Code of Federal Regulations, Part 112, (40 CFR 112).

**9. Hazardous Material Management and Spill Reporting Plan**

Any hazardous or potentially hazardous material that is brought onto the construction site will be handled properly in order to reduce the potential for stormwater pollution. All materials used on this construction site will be properly stored, handled, dispensed and disposed of following all applicable label directions. Flammable and combustible liquids will be stored and handled according to 29 CFR 1926.152. Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

Material Safety Data Sheets (MSDS) information will be kept on site for any and all applicable materials.

In the event of an accidental spill, immediate action will be undertaken by the General Contractor to contain and remove the spilled material. All hazardous materials, including contaminated soil

and liquid concrete waste, will be disposed of by the Contractor in the manner specified by federal, state and local regulations and by the manufacturer of such products. As soon as possible, the spill will be reported to the appropriate agencies. As required under the provisions of the Clean Water Act, any spill or discharge entering waters of the United States will be properly reported. The General Contractor will prepare a written record of any spill and associated clean-up activities of petroleum products or hazardous materials in excess of 1 gallon or reportable quantities, whichever is less. The General Contractor will provide notice to Developer immediately upon identification of a reportable spill.

Any spills of petroleum products or hazardous materials in excess of Reportable Quantities as defined by EPA or the state or local agency regulations, shall be immediately reported to the EPA National Response Center (1-800-424-8802) and areas of Oklahoma (1-800-522-0206).

**The State reportable quantity for petroleum products is:** regulated by Title 40 of The Code of Federal Regulations (40 CFR) part 110, 117, and 302, which states that “discharges of oil in such quantities that the Administrator has determined may be harmful to the public health or welfare of the environment of the United States include discharges of oil that: a) violate applicable water quality standards; or b) cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.” The State of Oklahoma does not specify a specific value for the reportable quantity for petroleum products.

The reportable quantity for hazardous materials can be found in 40 CFR 302 and the Code of Federal Regulations Webpage (<http://www.gpo.gov/fdsys/pkg/CFR-2003-title40-vol1/content-detail.html>) for additional information.

In order to minimize the potential for a spill of petroleum product or hazardous materials to come in contact with stormwater, the following steps will be implemented:

- a) All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, additives for soil stabilization, concrete, curing compounds and additives, etc.) will be stored in a secure location, under cover and in appropriate, tightly sealed containers, when not in use.
- b) The minimum practical quantity of all such materials will be kept on the job site and scheduled for delivery as close to time of use as practical.
- c) A spill control and containment kit (containing for example, absorbent material such as kitty litter or sawdust, acid neutralizing agent, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on the construction site and location(s) shown on Site Maps.
- d) All of the product in a container will be used before the container is disposed of. All such containers will be triple rinsed, with water prior to disposal. The rinse water used in these containers will be disposed of in a manner in compliance with state and federal regulations and will not be allowed to mix with stormwater discharges.
- e) All products will be stored in and used from the original container with the original product label.
- f) All products will be used in strict compliance with instructions on the product label.
- g) The disposal of excess or used products will be in strict compliance with instructions on the products label.

#### **10. Long-Term Pollutant Controls**

Stormwater pollutant control measures installed during construction, that will also provide stormwater management benefits after construction, include vegetative areas. An O&M Manual is

required by governing regulations to be a part of the SWPPP. There are no state post-construction storm water management requirements for the site.

**C. “Best Management Practices” (BMPs)**

Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct the General Contractor to provide immediate permanent or temporary pollution control measures.

During the construction phase, the General Contractor shall implement the following measures:

- 1) Materials resulting from clearing and grubbing or excavation operations shall be stockpiled up slope from adequate sedimentation controls. Materials removed to sites beyond the permitted project area shall be protected with appropriate controls and properly permitted and otherwise comply with applicable laws, all in accordance with this SWPPP, including Section V.D. below.
- 2) The General Contractor shall designate areas on the Site Maps for equipment cleaning, maintenance, and repair. The General Contractor and subcontractors shall utilize such designated areas. Cleaning, maintenance, and repair areas shall be protected by a temporary perimeter berm, shall not occur within 150 feet of any waterway, water body or wetland, and in areas located as far as practical from storm sewer inlets.
- 3) Use of detergents for large scale washing is prohibited (i.e. vehicles, buildings, pavement surfaces, etc.).
- 4) Chemicals. Paints, solvents, fertilizers, and other toxic materials must be stored in waterproof containers. Except during application, the containers, the contents must be kept in trucks or within storage facilities. Runoff containing such material must be collected, removed from the site, treated, and disposed of at an approved solid waste and chemical disposal facility.
- 5) Clearing and grubbing shall be held to a minimum necessary for grading and equipment operations. Construction must follow the sequencing specified on the plans and in the SWPPP to minimize the exposure time of graded or denuded areas

**V. LOCAL PLANS**

In addition to this SWPPP, construction activities associated with this project must comply with any guidelines set forth by local regulatory agencies.

**VI. INSPECTIONS AND SYSTEM MAINTENANCE**

Between the time this SWPPP is implemented and final Notice of Termination has been submitted, all disturbed areas, outfall points, and pollutant controls must be inspected daily. The purpose of site inspections is to assess performance of pollutant controls. The inspections will be conducted by the General Contractor’s Site Superintendent. Based on these inspections, the General Contractor will decide whether it is necessary to modify this SWPPP, add or relocate controls, or revise or implement additional Best management Practices in order to prevent pollutants from leaving the site via stormwater runoff. The General Contractor has the duty to cause pollutant control measures to be repaired, modified, supplemented, or take additional steps as necessary in order to achieve effective pollutant control. Note: If a BMP is covered by snow, mark the BMP as not applicable and document the reason the BMP can not be inspected on the daily report.

Examples of specific items to evaluate during site inspections are listed below. This list is not intended to be comprehensive. During each inspection, the inspector must evaluate overall pollutant control system performance as well as particular details of individual system components. Additional factors should be considered as appropriate to the circumstances. The General Contractor is responsible for measuring and recording site-specific rainfall amounts.

**A. Construction Exit and Track Out**

Locations where vehicles enter and exit the site must be inspected for evidence of sediment tracking beyond the permitted project area. A stabilized construction exit shall be constructed where vehicles enter and exit. Exits shall be maintained or supplemented with additional rock as necessary to prevent the release of sediment from vehicles leaving the site. Any sediment deposited on the roadway shall be swept as necessary throughout the day or at the end of every day and disposed of in an appropriate manner. Sediment shall **NOT** be washed into storm sewer systems.

**B. Erosion Control Devices**

Rolled erosion control products (nets, blankets, turf reinforcement mats) and marginally vegetated areas (areas not meeting required vegetative densities for final stabilization) must be inspected daily. Rilling, rutting and other signs of erosion indicate the erosion control device is not functioning properly and additional erosion control devices are warranted.

**C. Sediment Control Devices**

Sediment barriers, traps and basins must be inspected and they must be cleaned out at such time as their original capacity has been reduced by 50 percent. All material excavated from behind sediment barriers or in traps and basins shall be incorporated into on-site soils or spread out on an upland portion of the site and stabilized. To minimize the potential for sediment releases from the project site perimeter control devices shall be inspected with consideration given to changing up-gradient conditions.

**D. Material Storage Areas**

Material storage areas should be located to minimize exposure to weather. Inspections shall evaluate disturbed areas and areas used for storing materials that are exposed to rainfall for evidence of, or the potential for, pollutants entering the drainage system or discharging from the site. If necessary, the materials must be covered or original covers must be repaired or supplemented. Also, protective berms must be constructed, if needed, in order to contain runoff from material storage areas. All state and local regulations pertaining to material storage areas will be adhered to.

**E. Vegetation**

Consideration must be given to anticipated climate and seasonal conditions when specifying and planting seed. Seed shall be free of weedy species and appropriate for site soils and regional climate. Seed and mulch per the construction drawings immediately after topsoil is applied and final grade is reached. Grassed areas shall be inspected to confirm that a healthy stand of grass is maintained. Per the State General Permit, final site stabilization is achieved once all soil disturbing activities at the site have been completed, and one of the following criteria is met:

- a. A uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a uniform density of at least 70 percent of the (preferably) native vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures and all slopes and channels have been permanently stabilized against erosion, or
- b. Equivalent permanent stabilization measures (such as the use of riprap, permanent geotextiles, hardened surface materials including concrete, asphalt, gabion baskets, or Reno mattresses) have been employed..

Vegetated areas must be watered, fertilized, and reseeded as needed to achieve this requirement. The vegetative density must be maintained through project completion to be considered stabilized. Areas protected by erosion control blankets are not permanently stabilized until the applicable General Permit requirement for final vegetative density is achieved. Rip-rap, mulch, gravel, decomposed granite or other equivalent permanent stabilization measures may be employed in lieu of vegetation based on site-specific conditions and governing authority approval.

**F. Discharge Points**

All discharge points must be inspected to determine whether erosion and sediment control measures are effective in preventing discharge of sediment from the site or impacts to receiving waters.

**G. Special Project Areas**

Contractor is responsible for obtaining SWPPP related permits for any areas outside of the permitted project area.

The Inspection Report Form must identify all deficiencies, any corrections, whether they are identified during the current inspection or have occurred since the previous inspection, and any additional comments. Based on inspection results, any modification necessary to increase effectiveness of this SWPPP to an acceptable level must be made immediately but no longer than within 48 hours of the inspection. The inspection reports must be complete and additional information should be included if needed to fully describe a situation. An important aspect of the inspection report must identify whether the site was in compliance with the SWPPP at the time of inspection and specifically identify all incidents of non-compliance.

A responsible corporate officer must sign a letter delegating the site superintendent as the authorized position for conducting the required inspections. Inspection reports must include an original, authorized signature and date of the inspection. Inspection reports must be retained by the General Contractor as an integral part of this SWPPP for at least five years from the date of submission of the Notice of Termination of permit coverage.

Ultimately, it is the responsibility of the General Contractor to assure the adequacy of site pollutant discharge controls. Actual physical site conditions or contractor practices could make it necessary to install more structural controls than are shown on the plans. For example, localized concentrations of runoff could make it necessary to install additional sediment barriers. Assessing the need for additional controls and implementing them or adjusting existing controls will be a continuing aspect of this SWPPP until the site achieves final stabilization. Any modifications, additions or deletions of sediment control devices that may alter the hydraulic design of the site or are located in areas of potential high flow (basins, traps, check dams, diversions, etc.) must be approved by the CEC through the request for information process (RFI).

<b>APPENDIX A</b>	<b>SURVEY LEGAL DESCRIPTION</b>
<b>APPENDIX B</b>	<b>VICINITY MAP</b>
<b>APPENDIX C</b>	<b>NOTICE OF INTENT (NOI)</b>
<b>APPENDIX D</b>	<b>ENDANGERED SPECIES LIST</b>
<b>APPENDIX E</b>	<b>CONSTRUCTION SITE NOTICE</b>
<b>APPENDIX F</b>	<b>GENERAL PERMIT</b>
<b>APPENDIX G</b>	<b>NOTICE OF TERMINATION (NOT)</b>

## **APPENDIX A**

### **SURVEY LEGAL DESCRIPTION**

## Legal Description

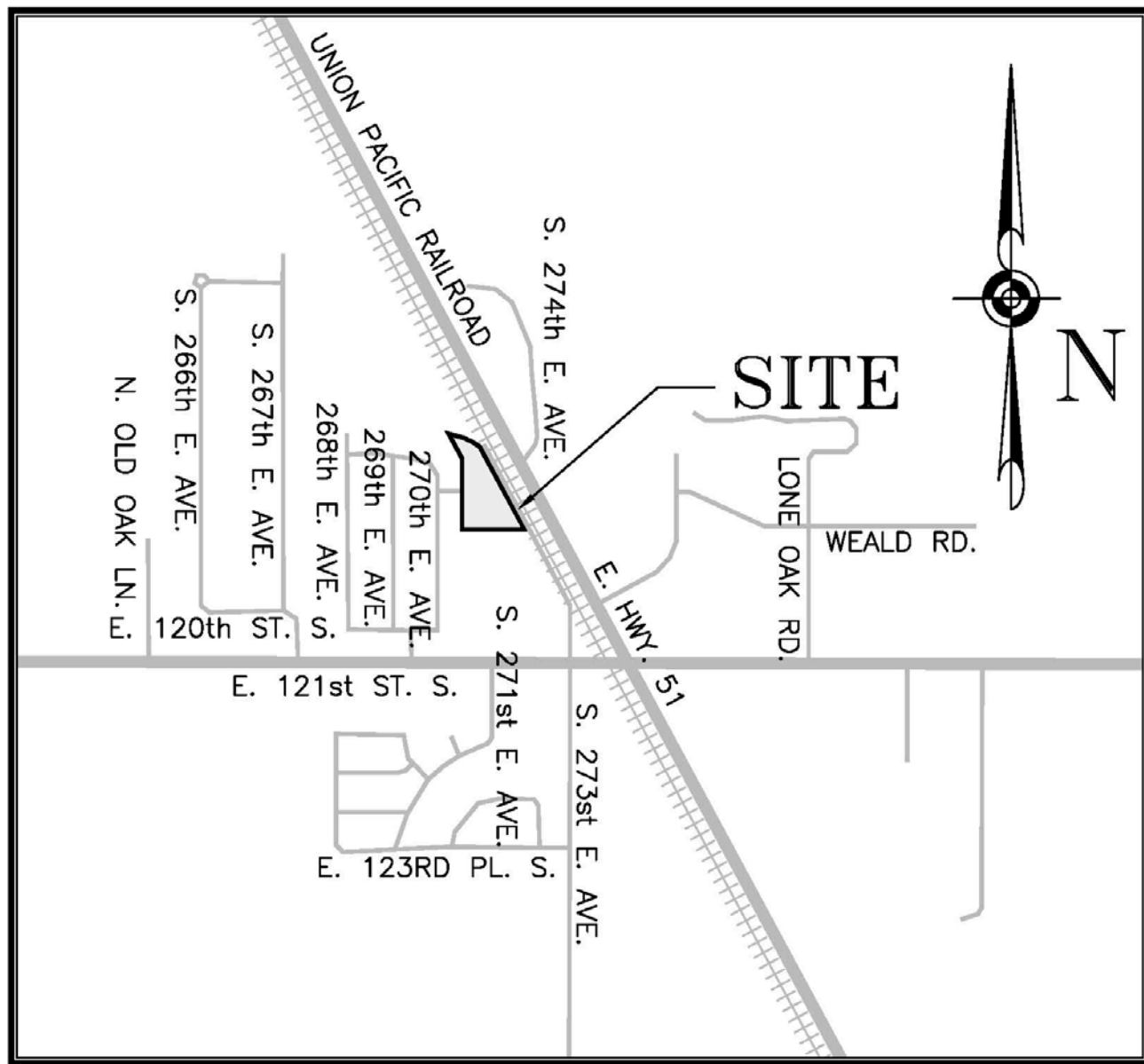
SITUATED IN THE SOUTHEAST 1/4 OF SECTION 35, TOWNSHIP 18 NORTH, RANGE 15 EAST, OF THE INDIAN BASE AND MERIDIAN ACCORDING TO THE U.S. GOVERNMENT SURVEY THEREOF, IN THE CITY OF COWETA, COUNTY OF WAGONER AND STATE OF OKLAHOMA AND BEING A PART OF LAND CONVEYED TO ROLAND INVESTMENTS, LTD BY DEED RECORDED IN DEED BOOK 2569, PAGE 354 IN THE WAGONER COUNTY CLERKS OFFICE AND IS FURTHER BOUNDED AND DESCRIBED AS FOLLOWS;

COMMENCING AT A FOUND 5/8" IRON REBAR FOUND AT THE SOUTHEAST CORNER OF THE SOUTHEAST 1/4, SECTION 35, TOWNSHIP 18 NORTH, RANGE 15 EAST; THENCE SOUTH 88°45'14" WEST A DISTANCE OF 245.69 FEET; THENCE NORTH 01°06'57" WEST A DISTANCE OF 443.00 FEET TO A POINT LYING IN A SOUTHERLY LINE OF LAND CONVEYED TO COWETA TRAILS, LP BY DEED RECORDED IN DEED BOOK 2591, PAGE 799 RECORDED IN THE WAGONER COUNTY CLERK'S OFFICE; THENCE ALONG SAID SOUTHERLY LINE NORTH 88°45'14" EAST A DISTANCE OF 112.55 FEET TO A 1/2" IRON REBAR, I.D. #1239, AT A SOUTHEASTERLY CORNER THEREOF SAID CORNER LYING IN A SOUTHWESTERLY RIGHT-OF-WAY OF SOUTH 273RD EAST AVENUE (60' WIDE); THENCE ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY NORTH 29°47'35" EAST A DISTANCE OF 369.46 FEET TO A 1/2" IRON REBAR FOUND, I.D. #1239 AT A NORTHEASTERLY CORNER OF LAND SO CONVEYED TO COWETA TRAILS, LP AND BEING THE POINT OF BEGINNING OF THE PREMISES HEREIN INTENDED TO BE DESCRIBED;

THENCE ALONG SAID NORTHERLY LINE SOUTH 88°44'45" WEST A DISTANCE OF 405.18 FEET TO A 1/2" IRON REBAR, I.D. #1239, LYING IN AN EASTERLY LINE OF LOT 5 OF THE TIMBER RIDGE PLAZA RECORDED BY PLAT IN PLAT NUMBER PLC4-310 IN THE WAGONER COUNTY CLERK'S OFFICE; THENCE ALONG SAID EASTERLY LINE OF SAID SUBDIVISION NORTH 01°22'13" WEST A DISTANCE OF 461.62 FEET TO A 1/2" IRON REBAR, I.D. #1239, FOUND AT AN ANGLE POINT IN THE EASTERLY LINE OF LOT 42 OF SAID SUBDIVISION; THENCE CONTINUING ALONG SAID EASTERLY LINE NORTH 29°46'21" WEST A DISTANCE OF 178.91 FEET TO A CAPPED 5/8" IRON REBAR SET, I.D. C. ED GRAY #1684; THENCE SOUTH 75°32'28" EAST A DISTANCE OF 100.62 FEET TO A CAPPED 5/8" IRON REBAR SET, I.D. C. ED GRAY #1684 AT AN ANGLE POINT THEREIN; THENCE SOUTH 67°29'59" EAST A DISTANCE OF 55.37 FEET TO A CAPPED 5/8" IRON REBAR SET, I.D. C. ED GRAY #1684 AT AN ANGLE POINT THEREIN; THENCE SOUTH 58°48'02" EAST A DISTANCE OF 62.33 FEET TO A CAPPED 5/8" IRON REBAR SET, I.D. C. ED GRAY #1684 LYING IN THE EXTENDED SAID SOUTHWESTERLY RIGHT-OF-WAY SOUTH 273RD EAST AVENUE; THENCE ALONG SAID EXTENDED SOUTHWESTERLY RIGHT-OF-WAY SOUTH 29°47'35" EAST A DISTANCE OF 609.93 FEET TO THE PLACE OF BEGINNING CONTAINING 148,802 SQ. FT. OR 3.42 ACRES (MORE OR LESS) OF LAND.

## **APPENDIX B**

### **VICINITY MAP**




**VICINITY MAP**  
SCALE=N.T.S.

## **APPENDIX C**

### **NOTICE OF INTENT (NOI)**



<b>IV. Site/Project Discharge Information</b> <i>Use additional sheets of paper if necessary.</i>			
Does the site/project discharge stormwater into an MS4? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		Name of the MS4 _____	
Name of all Receiving Waterbodies	Is the waterbody impaired? If so, what are its impairments?	Is there a TMDL for that impairment?	
<b>Coweta Creek</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Endangered Species Eligibility</b> a. <input checked="" type="checkbox"/> My site/project is not located within any of the corridors of federal and state identified Aquatic Resources of Concern (ARC). b. <input type="checkbox"/> My site/project is located within a corridor of federal and state identified ARC. c. <input type="checkbox"/> If one of the eligibility criteria cannot be met, I may use Addendum D for equivalent sediment controls. d. <input type="checkbox"/> I am required to have an Endangered Species Act Section 7 consultation process. e. <input type="checkbox"/> I am relying on another permittee's certification of eligibility and agree to comply with the conditions of that certification.			
<b>V. Stormwater Pollution Prevention Plan (SWP3) Information</b>			
Has the SWP3 been prepared and is it available on-site for review? <input checked="" type="checkbox"/> Yes (SWP3 must be developed prior to NOI submittal) Is the operator registered and in good standing with the Secretary of State of Oklahoma? <input type="checkbox"/> Yes <input type="checkbox"/> No Does your site/project have construction support activities? <input type="checkbox"/> Yes (asphalt batch plant) <input type="checkbox"/> Yes (concrete batch plant) <input type="checkbox"/> Other (e.g., equipment storage yards, material storage areas, excavated material disposal areas, borrow areas, etc.) <input checked="" type="checkbox"/> No			
<b>Proposed Best Management Practices (BMPs) to control pollution in the stormwater discharges, check all that apply:</b> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/> Construction phased</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Sediment basin/trap</div> <div style="width: 50%;"><input type="checkbox"/> Mulching/seeding/sodding</div> <div style="width: 50%;"><input type="checkbox"/> Vegetated buffer</div> <div style="width: 50%;"><input type="checkbox"/> Vehicle/concrete wash-out</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Site inspection</div> <div style="width: 50%;"><input type="checkbox"/> Diversion dikes</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Inlet protection</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Construction entrances</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Silt fence</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Waste management</div> <div style="width: 50%;"><input type="checkbox"/> Stream crossings</div> <div style="width: 50%;"><input type="checkbox"/> Spill prevention/cleanup</div> <div style="width: 50%;"><input type="checkbox"/> Employee training</div> <div style="width: 50%;"><input type="checkbox"/> Compost blanket/geotextiles</div> <div style="width: 50%;"><input type="checkbox"/> Check dams</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Construction sequencing</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Riprap</div> <div style="width: 50%;"><input type="checkbox"/> Gradient terraces</div> <div style="width: 50%;"><input type="checkbox"/> Silt dikes</div> </div> Other BMPs: _____			
<b>Post-construction Best Management Practices for construction activities, check all that apply:</b> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"><input type="checkbox"/> Narrow street/turnaround</div> <div style="width: 50%;"><input type="checkbox"/> Wet/dry pond</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Protected natural features</div> <div style="width: 50%;"><input type="checkbox"/> Vegetated filter strips</div> <div style="width: 50%;"><input type="checkbox"/> Eliminated curbs &amp; gutters</div> <div style="width: 50%;"><input type="checkbox"/> Wetland</div> <div style="width: 50%;"><input type="checkbox"/> Infiltration basin/trench</div> <div style="width: 50%;"><input type="checkbox"/> Porous pavement</div> <div style="width: 50%;"><input type="checkbox"/> Bio-retention/rain gardens</div> <div style="width: 50%;"><input type="checkbox"/> Riparian</div> <div style="width: 50%;"><input type="checkbox"/> Redevelopment/retrofit</div> <div style="width: 50%;"><input checked="" type="checkbox"/> Grassed swales</div> <div style="width: 50%;"><input type="checkbox"/> Low impact development</div> <div style="width: 50%;"><input type="checkbox"/> Green designs</div> <div style="width: 50%;"><input type="checkbox"/> Conservation easements</div> <div style="width: 50%;"><input type="checkbox"/> Retrofit</div> </div> Other BMPs: _____			
<b>VI. Required Attachments</b>			
<input checked="" type="checkbox"/> A legible site map showing your facility location and boundaries, including support activities, and all waters of the state within one mile of the site. <input checked="" type="checkbox"/> Application fee (\$100.00) and first-year permit fee (\$347.71) or <input type="checkbox"/> Fees have already been paid			
<b>VII. Certification</b>			
<i>"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."</i>			
Print Name: <u>J. Ryan Hamilton</u>		Title: <u>Manager of its General Partner</u>	
E-mail: <u>ryanhamilton@hamiltoncorporation.com</u>		Phone: <u>(417) 882-1701</u>	
Signature: 		Date: <u>4/25/23</u>	
For DEQ use only: Assigned Authorization Number: <u>OKR10</u>			



## Instructions for Completing NOI Form 606-002A for Stormwater Discharges Associated with Construction Activities on Sites of One or more acres under the OPDES Construction General Permit OKR10

### Who Must File an NOI Form

Under Section 402(p) of the Clean Water Act and regulation at 40 C.F.R. § 122.26, adopted and incorporated by reference in Oklahoma Administrative Code (OAC) 252:606-1-3(b)(3)(L), stormwater discharges associated with construction activities are prohibited to waters of the state unless authorized under an Oklahoma Pollutant Discharge Elimination System (OPDES) permit from the Oklahoma Department of Environmental Quality (DEQ). Operators of construction sites where one or more acres are disturbed and smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre must obtain coverage under the OPDES Construction General Permit (CGP) OKR10 by submitting a completed NOI to DEQ. If you have questions regarding permit coverage under the Stormwater Program, you may call the Stormwater Unit of Environmental Complaints and Local Services (ECLS) of DEQ at (405) 702-6100 or email to [ecls-stormwaterpermitting@deq.ok.gov](mailto:ecls-stormwaterpermitting@deq.ok.gov).

### Completing the NOI Form

To complete an NOI form, type or print in all the appropriate places of the form. Check the appropriate box whether you are filing for a new application, amendment/modification, or renewal of your current permit authorization. Enter your current authorization number if you are applying for permit amendment/modification or renewal.

### Section I. Operator Information

Provide the legal name, mailing address and telephone number of the company/firm, public organization, or any other entity that either individually or together meets the following two criteria: (1) have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications (e.g., in most cases this is the owner of the site); and/or (2) have the day-to-day operational control of those activities at the site necessary to ensure compliance with Stormwater Pollution Prevention Plan (SWP3) and/or other permit conditions (i.e., they are authorized to direct workers at a site to carry out activities required by the permit; in most cases this is the general contractor of the project). Also enter the name, title, phone number, and email address for the operator's point of contact.

### Section II. Site/Project Information

Provide the site/project's official or legal name, phone number and street address or general location information (e.g., Intersection of State Highways 61 and 34). Also provide the name, title, phone number, and email address for the site/project's point of contact.

Indicate the purpose of the project (e.g., residential subdivision, commercial building, road and/or bridge, wind farm, etc.).

Provide latitude and longitude of the construction project or site (at the center of the site). Latitude and Longitude can be obtained online at DEQ and USGS's websites or other mapping tools.

Provide the estimated starting and ending dates of the construction on site or project. The date must be provided in MM-DD-YYYY where MM is the month, DD is the date and YYYY is the year. Provide total area of construction site, and estimated area to be disturbed in acres. Provide total impervious area before construction starts (pre-construction) and total impervious area after construction completed (post-construction) in acres.

Provide post-construction runoff coefficient of the site after the construction addressed in the NOI is completed. Operator may use recommended runoff coefficients in Addendum E of the OKR10 permit. Average coefficients for composite areas may be calculated on an area weighted basis from  $C = \sum C_i A_i / \sum A_i$ , where  $C_i$  is the coefficient applicable to the area  $A_i$ .

Describe the nature of fill material and existing soil data describing soils (e.g., coarse-grained soils: gravels, sands, or fine-grained soils: silts and clays, and highly organic soils, etc.). Operators may use soil classification chart in Attachment I of Addendum D to determine the types of the soils on the site. Indicate whether this is the site of the common plan of development or sale. Enter the current OKR10 authorization number if it is part of a common plan of development or sale.

Complete the section on Endangered Species Eligibility by checking the appropriate box: (a) the site/project is not located within any of the corridors of the federal or state identified Aquatic Resources of Concern (ARC) and further investigation is not required; or (b) the site/project is located within a corridor of a federal or state identified ARC. Operators must provide and implement measures to protect the endangered or threatened species or their critical habitat; or (c) If one of those eligibility criteria under Part 2.5.B.3.b, d, or e cannot be met, operator may use Addendum D to evaluate alternatives of buffer requirements and select equivalent sediment controls or contact DEQ for further consultation; or (d) operator's federally approved construction activities are authorized by the appropriate federal or state agency and that authorization addresses the Endangered Species Act Section 7 consultation for the operator's stormwater discharge or stormwater-related activities. Operator selecting option d must include documentation from the United States Fish and Wildlife Service (USFWS) or a qualified biologist that demonstrates Section 7 consultation has been completed. The SWP3 must include any conditions resulting from that consultation; or (e) operator's stormwater discharges and stormwater-related activities were already addressed in another operator's certification of eligibility that included the proposed site/project area. Operator agrees to comply with any conditions attached to that certification.

### Section III. Notification of Multiple Operators

Indicate whether all operators on the site will be covered under this authorization or have obtained/will obtain their own authorizations. If operators will be obtaining their own authorizations, indicate whether they will be documented in the SWP3 or, for new owner/operators, in Form 605-NCO which shall be kept with the SWP3.

### Section IV. Site/Project Discharge Information

Indicate whether the site/project discharges stormwater to a Municipal Separate Storm Sewer System (MS4). If yes, enter the name of the MS4. A MS4 is defined as a conveyance or system of conveyances, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains that are owned or operated by a state, city, town, borough, parish, district, association, or other public body which is designed or used for collecting or conveying stormwater. Identify all the receiving waterbodies from the sites that discharge stormwater, including names of those waterbodies. Check appropriate box if the receiving waterbody is listed in DEQ 303(d) impaired waterbodies or drains to watershed with approved Total Maximum Daily Loads (TMDL) report. Identify the pollutant(s) for which the waterbody is impaired.

For a current list of MS4s in the State of Oklahoma, review the 2021 OKR04 Fact Sheet located at <https://www.deq.ok.gov/stormwater-permitting/okr04-municipal-stormwater>.



## Instructions for Completing NOI Form 606-002A for Stormwater Discharges Associated with Construction Activity of One or More Acres under the OPDES Construction General Permit OKR10

### Section V. Stormwater Pollution Prevention Plan (SWP3) Information

All sites/projects eligible for coverage under the CGP OKR10 permit must prepare a SWP3 prior to submitting the NOI to DEQ. The SWP3 is intended to document the selection, design, and installation of different control measures to meet the permit's non-numeric technology based effluent limitations, if applicable, numeric effluent limitations, and water quality-based effluent limitations contained in Part 3 of the Permit as well as to document compliance with other permit requirements. The SWP3 must be prepared by a qualified person in accordance with good engineering practices and to industry standards. The SWP3 is considered a "living document" and must be maintained/updated regularly to accurately reflect current site conditions. Check the appropriate box if the SWP3 has been prepared and is available on site. Check the appropriate box if the operator has registered for construction activities with the Secretary of State of Oklahoma.

List all the proposed Best Management Practices (BMPs) for construction activities. Operator must describe the proposed measures, including BMPs to control pollutants in stormwater discharges during construction. Specify any BMPs to be used if additional erosion and sediment controls are required by local government or due to specific site conditions.

List all the post-construction proposed Best Management Practices (BMPs) for construction activities. Operator must describe the proposed measures to be used to control pollutants in stormwater discharges that will occur after construction operations have been completed, including any BMPs to be used if additional erosion and sediment controls are required by local government or due to specific site conditions.

### Section VI. Required Attachments

Submit the following with the NOI:

- A legible site map showing your facility location and boundaries, including support activities, and all waters of the state within one mile of the site, and
- The application fee and permit fee or indicate if fees have already been paid
  - Renewal NOI - \$100 application fee,
  - New NOI - \$447.71 (\$100 application fee and \$347.71 annual permit fee).

### Section VII. Certification

Federal regulations require all permit applications and report shall be signed as follows:

**For a corporation:** by a responsible corporate officer, which means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (ii) the manager of one or more

manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental law and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents had been assigned or delegated to the manager in accordance with corporate procedures;

**For a limited liability company (LLC):** by a member, managing or otherwise;

**For a partnership:** by a general partner;

**For a sole proprietorship:** by the proprietor (owner); or

**For a municipality, state, federal, or other public facility:** by either a principal executive or ranking elected official.

### Modifying an Existing NOI

After issuance of an authorization, an NOI modification may be submitted by a permittee if circumstances change (e.g., the area to be disturbed has increased from 20 acres to 40 acres). However, the modification of an NOI cannot be used if the area to be disturbed has decreased (e.g., the area to be disturbed has been changed from 40 acres to 20 acres). The amended NOI shall include the operator's assigned authorization number and request a change.

The original authorization number will be retained. DEQ will provide an acknowledgement by either mail or email that the amended NOI has been received and processed. Permittees must update their SWP3 to reflect the modification.

### Submitting Your NOI Form and Required Attachments

The completed NOI form and all required attachments must be submitted to the following address, fax, or email:

Stormwater Unit of ECLS  
Oklahoma DEQ  
P.O. Box 1677, Oklahoma City, OK 73101-1677

Fax to (405)702-6226

Email to [ecls-stormwaterpermitting@deq.ok.gov](mailto:ecls-stormwaterpermitting@deq.ok.gov)

Once DEQ's online NOI submission tool is made available, NOIs may also be completed and submitted electronically using that tool.

## **APPENDIX D**

### **ENDANGERED SPECIES LIST**

## Mammals

NAME	STATUS
Gray Bat <i>Myotis grisescens</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/6329">https://ecos.fws.gov/ecp/species/6329</a>	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Threatened

## Birds

NAME	STATUS
Least Tern <i>Sterna antillarum</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/8505">https://ecos.fws.gov/ecp/species/8505</a>	Endangered
Piping Plover <i>Charadrius melodus</i> There is final critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a>	Threatened
Red Knot <i>Calidris canutus rufa</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/1864">https://ecos.fws.gov/ecp/species/1864</a>	Threatened
Whooping Crane <i>Grus americana</i> There is final critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a>	Endangered

## Insects

NAME	STATUS
American Burying Beetle <i>Nicrophorus americanus</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/66">https://ecos.fws.gov/ecp/species/66</a>	Endangered

## Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

**APPENDIX E**

**CONSTRUCTION SITE NOTICE**

To be located on the SWPPP Information Sign

# CONSTRUCTION SITE NOTICE

## FOR THE NPDES GENERAL PERMIT

<b>General Contractor Company Name:</b>					
<b>General Contractor Address:</b>					
<b>Telephone:</b>					
<b>Site Contacts Name &amp; Number:</b> (both Site Superintendents)	<table border="1"><tr><td>Name</td><td>Phone Number</td></tr><tr><td>Name</td><td>Phone Number</td></tr></table>	Name	Phone Number	Name	Phone Number
Name	Phone Number				
Name	Phone Number				
<b>Project Description:</b>	<b>Coweta Trails II Senior Apartments Coweta, OK 47,826 SF Disturbed Area: 4.5 Acres</b>				

## **APPENDIX H**

### **GENERAL PERMIT**

The OKR10 General Permit can be found online at <https://www.deq.ok.gov/wp-content/uploads/water-division/Final-CGP-2017.pdf>. If conflicts arise, the General Permit will govern over the Summary.

# **GENERAL PERMIT OKR10**

**FOR STORMWATER DISCHARGES  
FROM CONSTRUCTION ACTIVITIES  
WITHIN THE STATE OF OKLAHOMA**

**OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY  
WATER QUALITY DIVISION**

**ORIGINAL EFFECTIVE DATE: OCTOBER 18, 2022**

**MODIFICATION EFFECTIVE DATE: APRIL 1, 2023**



## Stormwater General Permit for Construction Activities within the State of Oklahoma

### Permit No. OKR10

#### Authorization to Discharge Under the Oklahoma Pollutant Discharge Elimination System (OPDES) Act

In compliance with the Clean Water Act, as amended, (33 U.S.C. § 1251 *et seq.*) and the provisions in 40 Code of Federal Regulations (C.F.R.) § 122.26, adopted and incorporated by reference in Oklahoma Administrative Code (OAC) 252:606-1-3(b)(3)(L), and under the OPDES Act, 27A O.S. § 2-6-201 *et seq.*, as amended, except as provided in Part 2.3 of this permit, Operators of stormwater discharges from construction activities (as defined in Part 1 of this permit), located in an area specified in Part 2.1, are authorized to discharge in accordance with the conditions and requirements set forth herein. Only those Operators of stormwater discharges from construction activities in the general permit area who submit a Notice of Intent (NOI) and receive an authorization to discharge in accordance with Part 3 of this permit are authorized under this permit.

This permit is a modification issued by the Oklahoma Department of Environmental Quality (DEQ) and shall become effective on April 1, 2023. This permit replaces the permit issued on October 18, 2017. This permit and the authorizations issued under the permit shall expire at midnight, October 17, 2027.

Signed and issued this 31st day of March, 2023.



Shellie R. Chard, Director  
Water Quality Division



Michael B. Moe, P.E, Engineering Manager  
Municipal Discharge & Stormwater Permits Section  
Water Quality Division

**GENERAL PERMIT OKR10 FOR STORMWATER DISCHARGES  
FROM CONSTRUCTION ACTIVITIES WITHIN THE STATE OF OKLAHOMA**

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**PART 1 DEFINITIONS AND ACRONYMS**

- A. **Applicant** means any person who is contemplating or planning to submit an NOI for approval or has submitted an NOI for approval and is waiting for authorization to discharge stormwater under the provisions of this permit.
- B. **Aquatic Resource of Concern ("ARC")** means a waterbody corridor which contains habitat (including critical habitat) for federally listed (by the U.S. Fish and Wildlife Service) or state listed (by the Oklahoma Department of Wildlife Conservation) endangered or threatened aquatic species.
- C. **Best Management Practice ("BMP")** means a schedule of activities, prohibition of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the state. BMPs also include treatment requirements, operating procedures, and practice to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
- D. **Clean Water Act ("CWA")** [33 U.S.C. § 1251 *et seq.*] (formerly referred to as the Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended, Pub. L. 95-211, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117.
- E. **Commencement of Construction** means the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.
- F. **Control Measure** as used in this permit refers to any BMP or other method used to prevent or reduce the discharge of pollutants to waters of the state.
- G. **Construction Activities** means earth-disturbing activities, such as the clearing, grading, excavation of land, or other construction-related activities (e.g., stockpiling of fill material; placement of raw materials at the site) that could lead to the generation of pollutants. This does not include the linear opening of soil in a single line of two feet or less in width, on sites that have not been previously disturbed, utilizing equipment that immediately closes the opening as part of the equipment's normal operation by the closure of the sidewalls to their original configuration after passage. Some of the types of pollutants that are typically found at construction sites are sediment, nutrients, heavy metals, pesticides and herbicides, oil and grease, bacteria and viruses, trash, debris, and solids, treatment polymers or any other toxic chemicals.
- H. **Construction Site or Site or Development or Project or Construction** means the land or water area where construction activities will occur and where stormwater controls will be installed and maintained. The construction site or development or project includes construction support activities, which may be located at a different part of the property from where the primary construction activity will take place, or on a different piece of property altogether.
- I. **Construction Support Activity** means a construction-related activity that specifically supports the construction activity and involves earth disturbance or pollutant-generating activities of its own, and can include activities associated with concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, and borrow areas.
- J. **Corrective Actions** are actions that permittees take in compliance with this permit to:
  - a. Repair, modify, or replace any stormwater control used at the site;
  - b. Clean up and dispose of spills, releases, or other deposits; or
  - c. Remedy a permit violation.
- K. **Dewatering Activities** means the act of draining rainwater and/or ground water from building foundations, vaults, trenches and other construction structures.
- L. **Discharge** when used without qualification means the "discharge of a pollutant."
- M. **Discharge of Stormwater Associated with Construction Activity** as used in this permit, refers to a discharge of pollutants in stormwater runoff from areas where soil disturbing activities (e.g., clearing, grading, or excavation), construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck washout, fueling), or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants) are located.
- N. **Ephemeral Stream** means an entire stream which flows only during or immediately after a rainfall event, and contains no refuge pools capable of sustaining a viable community of aquatic organisms.
- O. **Facility or Activity** means any OPDES "point source" or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the OPDES program.

- P. **Hazardous Substances or Hazardous or Toxic Waste** means any liquid, solid, or contained gas that contain properties that are dangerous or potentially harmful to human health or the environment. See also 40 C.F.R. § 261.3.
- Q. **Immediately** means as soon as practicable but no later than the end of the next work day.
- R. **Impaired Water (or Water Quality Impaired Water)** is the water identified by the state, or EPA as not meeting applicable state water quality standards and (1) requires development of a TMDLs (pursuant to Section 303(d) of the CWA; or (2) is addressed by an EPA/state approved or established TMDL; (3) is not in either of the above categories but the waterbody is covered by a pollution control program that meets the requirements of 40 C.F.R. § 130.7(b)(1).
- S. **Large Common Plan of Development or Sale** means an area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one proposed plan. This plan consists of many small construction projects that collectively add up to one or more acres of total disturbed land. For example, an original common plan of development of a residential subdivision might lay out the streets, house lots, and areas for parks, schools and commercial development that the developer plans to build or sell to others for development. All these areas would remain part of the common plan of development or sale until the intended construction is completed.
- T. **Leachable Hazardous Substance** refers that those hazardous substances are naturally extracted from material during rain or routine external building wash events.
- U. **Municipal Separate Storm Sewer System ("MS4")** is defined at 40 C.F.R. § 122.26(b)(8) to mean a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):
- Owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
  - Designed or used for collecting or conveying stormwater;
  - Which is not a combined sewer; and
  - Which is not part of a Public Owned Treatment Works ("POTW") as defined at 40 C.F.R. § 122.2.
- e. Note: A Phase II MS4 can also be owned or operated by federal and state government, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. [see 40 C.F.R. § 122.26(b)(16)]
- V. **Non-Process Water** means utility wastewaters (e.g., water treatment residuals, boiler blowdown, and air pollution control wastewaters from heat recovery equipment); treated or untreated wastewaters from groundwater remediation systems; dewatering water for building foundations; and other wastewater streams not associated with a production process.
- W. **Notice of Intent ("NOI")** means Notice of Intent (DEQ Form 606-002A).
- X. **Notice of Termination ("NOT")** means Notice of Termination (DEQ Form 606-003).
- Y. **Operator** for the purpose of this permit and in the context of stormwater associated with construction activity, means any party associated with a construction project that meets either of the following two criteria:
- The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications (in most cases this is the owner of the site); or
  - The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a Stormwater Pollution Prevention Plan ("SWP3") for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities specified by the SWP3 or comply with other permit conditions; in most cases this is the general contractor of the project).
- In addition, "owner" refers to the party that owns the structure being built. Ownership of the land where construction is occurring does not necessarily imply the property owner is an operator (e.g., a landowner whose property is being disturbed by construction of a gas pipeline or a landowner who allows a mining company to remove dirt, shale, clay, sand, gravel, etc. from a portion of his property). This definition is provided to inform permittees of DEQ's interpretation of how the regulatory definitions of "operator" and "facility or activity" are applied to discharges of stormwater associated with construction activity.
- Z. **OPDES** means the Oklahoma Pollutant Discharge Elimination System.

- AA. **Outstanding Resource Waters (“ORW”)** means those waters of the state which are designated as such in Oklahoma’s Water Quality Standards OAC 252:730-5-25, Appendix A.
- BB. **Permit** means the General Permit OKR10 for Stormwater Discharges from Construction Activities within the State of Oklahoma.
- CC. **Permittee** means a person who has submitted an NOI and has received authorization to discharge stormwater from construction or land disturbing activities under this permit.
- DD. **Point Source** means any discernible, confined, and discrete conveyance, including but are not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, landfill leachate collection system, or vessel or other floating craft, from which pollutants or wastes are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
- EE. **Pollutant** means any material, substance, or property which may cause pollution (e.g., dredged spoil, solid waste, sewage, garbage, sewage sludge, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial or municipal waste).
- FF. **Qualified Person or Qualified Personnel** means those persons (either the operator’s employees or outside personnel) who are knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possess the skills and training to assess conditions at the construction site that could impact stormwater quality, and who possess the skills and training to assess the effectiveness of any control measures selected to control the quality of stormwater discharges from the construction activity. For inspections that are required in accordance with Addendum C, a qualified person or qualified personnel means those persons (either the operator’s employees or outside personnel) who are knowledgeable in the principles and practices of construction stormwater controls and pollution prevention, and who possess the education and ability to assess conditions that could impact stormwater quality and assess the effectiveness of stormwater controls selected and installed to meet the requirements of the permit..
- GG. **Runoff Coefficient** means the fraction of total rainfall that will appear at the conveyance as runoff.
- HH. **Stabilization** is the process of covering exposed ground surfaces with vegetative or non-vegetative practices that reduce erosion and prevent sediment discharge from occurring.
- II. **Stormwater** means rainwater runoff, snowmelt runoff, and surface runoff and drainage.
- JJ. **Stormwater Associated with Industrial Activity** is defined at 40 C.F.R. §§ 122.26 (b) (14) & (15) and incorporated here by reference. Most relevant to this permit is 40 C.F.R. § 122.26 (b) (14) (x) and 40 C.F.R. § 122.26 (b) (15) (i), that relates to construction activity including clearing, grading, and excavation activities that result in the disturbance of one or more acres of total land area, or less than one acre if part of a larger common plan of development or sale.
- KK. **Stormwater Discharge-Related Activity** is defined as disturbance activities that cause, contribute to, or result in point source stormwater pollutant discharges, including but are not limited to excavation, site development, grading, and other land disturbing activities; and control measures to control stormwater discharges including the siting, construction, and operation of BMPs to control, reduce, or prevent stormwater pollution.
- LL. **Stormwater Pollution Prevention Plan (“SWP3”)** See Part 5.
- MM. **Takes or Taking** means any action that would “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” any threatened or endangered species. Harm may include significant habitat modification that actually injures a species.
- NN. **Total Maximum Daily Load (“TMDL”)** means the sum of the individual waste load allocations (“WLAs”) for point sources, safety, reserves, and loads from nonpoint sources and natural background.
- OO. **Waters of the State** means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, storm sewers and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof, and shall include under all circumstances the waters of the United States which are contained within the boundaries of, flow through, or border upon this state or any portion thereof. Provided, waste treatment systems, including treatment ponds or lagoons designed to meet federal and state requirement other than cooling ponds as defined in the Clean Water Act or rules promulgated thereto and prior converted cropland are not waters of the state. (as defined in Oklahoma Statutes 27A O.S. § 1-1-201).

**PART 2 COVERAGE UNDER THIS PERMIT****2.1 Eligibility****A. Area of Coverage where DEQ is the Permitting Authority**

This permit authorizes discharges of stormwater and certain non-stormwater discharges from construction activities. All operators of construction activities meeting any of the requirements below are required to comply with this permit:

1. Construction sites that are greater than, or equal to, one acre<sup>1</sup>.
2. Construction sites that are less than one acre if it is part of a larger common plan of development or sale which will ultimately disturb land equal to or greater than one acre<sup>1</sup>.

**B. Area of Coverage where Another Agency is the Permitting Authority**

Under the Environmental Protection Agency's ("EPA's") approval of the Oklahoma Pollutant Discharge Elimination System ("OPDES") program, DEQ has had stormwater permitting and enforcement responsibility for large and small construction activities since November 19, 1996, except for construction activities below:

1. Any construction activity on Indian country lands in Oklahoma.
2. Construction activity associated with oil and gas extraction<sup>2</sup> under the Standard Industrial Classification ("SIC") Group 13<sup>3</sup>, crude petroleum and refined petroleum products pipelines under SIC Group 46<sup>4</sup>, and natural gas transmission under SIC Group 492<sup>5</sup>.
3. Construction activities associated with agricultural production and services<sup>6</sup> under SIC Groups 01, 02 and 07; forestry under SIC Group 08; and fishing, hunting and trapping under SIC Group 09<sup>7</sup>.

**2.2 Types of Authorized Discharges****A. Authorized Stormwater Discharges**

1. This permit authorizes discharges associated with construction activities from sites meeting the requirements in Part 2.1.A.
2. This permit authorizes discharges associated with construction support activities (e.g., concrete or asphalt batch plants<sup>8</sup>, equipment staging yards, material storage areas, excavated material disposal areas, and borrow areas) provided:
  - a. The construction support activity is directly related to a construction site that is required to have this permit coverage for discharges of stormwater associated with construction activity.
  - b. The construction support activity is not a commercial operation, does not serve multiple unrelated construction projects by different operators, and does not operate beyond the completion of the construction activity at the last construction project it supports.

<sup>1</sup> As defined in 40 C.F.R. § 122.26 (b)(14)(x) for construction sites of five or more acres, and 40 C.F.R. § 122.26 (b)(15)(i) for construction sites of more than one acre but less than five acres, including the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb land equal to or greater than one acre, and those construction site discharges designated by DEQ as needing a stormwater permit under 40 C.F.R. § 122.26 (a)(1)(v), or under § 122.26 (a)(9) and § 122.26 (g)(1)(i).

<sup>2</sup> An authorization to discharge stormwater from a construction activity associated with oil and gas extraction under the SIC Group 13, or pipelines under SIC Group 46, or natural gas transmission under SIC Group 492, may be obtained through the EPA National Pollutant Discharge Elimination System ("NPDES") eReporting Tool for its Construction General Permit ("CGP").

<sup>3</sup> DEQ shall have jurisdiction over natural gas liquid extraction plants under SIC 1321 and service company base operating stations under SIC 1389.

<sup>4</sup> Except pipelines within certain facilities regulated by DEQ.

<sup>5</sup> DEQ shall have jurisdiction over natural gas liquid extraction plants under SIC 1321.

<sup>6</sup> An authorization to discharge stormwater from construction activities associated with agricultural and forestry, fishing production and services under SIC groups 01, 02, 07, 08 and 09, may be obtained by contacting the Oklahoma Department of Agriculture, Food & Forestry's Agriculture Pollutant Discharge Program at (405)522-5493.

<sup>7</sup> DEQ shall have jurisdiction over SIC group 092 (fish hatcheries and preserves).

<sup>8</sup> These discharges are subject to numeric effluent limitation guidelines in Part 4.5 "Numeric Technology-Based Effluent Limitations" and Appendix C.

- c. Appropriate controls and measures must be identified in the Notice of Intent ("NOI") and the facility's Stormwater Pollution Prevention Plan ("SWP3") covering the discharges from the construction support activity areas.
  - d. The construction support activity is not located within the watershed of an Outstanding Resource Water ("ORW").
- B. Authorized non-stormwater discharges are
- 1. potable water, including uncontaminated waterline and fire hydrant flushing;
  - 2. landscape irrigation water provided all pesticides, herbicides, and fertilizers have been applied in accordance with the approved manufacturers' instructions and/or labeling;
  - 3. water used to control dust;
  - 4. uncontaminated air conditioning or compressor condensate;
  - 5. uncontaminated groundwater or spring water;
  - 6. waters used to wash vehicles and equipment where soaps, solvents or detergents are not used;
  - 7. routine external building wash-down that does not use soaps, solvents and/or detergents and/or building wash-down from external surfaces that does not contain leachable hazardous substances (e.g., paint or caulk containing polychlorinated biphenyls ("PCBs"));
  - 8. pavement washing waters provided spills or leaks of toxic or hazardous substances have not occurred (unless all spilled material has been removed) and where soaps, solvents and detergents are not used;
  - 9. foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water;
  - 10. discharges or flows from emergency firefighting activities that either: a) do not involve per- and polyfluoroalkyl substances (PFAS)-containing aquatic firefighting foams (AFFFs), or b) involve PFAS-containing AFFFs and are consistent with Part 4.4.F of this permit. Measures shall be taken by the permittee or site/facility, as soon as practicable, to reduce any such pollutant releases to avoid or minimize the impacts on water quality and to ensure public health and safety. After the emergency has ceased, non-stormwater discharges (e.g., discharges associated with clean-up) are prohibited. Determination of cessation of the emergency is at the discretion of the emergency on-site coordinator; and
  - 11. uncontaminated flows from dewatering activities, including dewatering of trenches and excavations, will be allowed if operational and structural controls are used to reduce any pollutant releases to avoid or minimize the impacts on water quality (see Part 4.2.M). These controls must be included in your SWP3.
- C. Non-stormwater discharges are authorized only under the following conditions:
- 1. Document in your SWP3 which authorized non-stormwater discharges will be present on your site and where they will be discharged.
  - 2. If necessary, ensure these discharges are directed to vegetated areas, existing controls, or implement additional controls to minimize the discharge of pollutants.

### 2.3 Limitations on Coverage

- A. This permit does not authorize stormwater discharges that originate from the site after construction activities have been completed and the site, including any temporary construction support activity site, has undergone final stabilization and has an approved Notice of Termination ("NOT"). Industrial post-construction stormwater discharges may need to be covered by a separate OPDES permit.
- B. This permit does not authorize discharges that are mixed with sources of non-stormwater, other than those discharges that are identified in Part 2.2.B and are in compliance with this permit or with a separate OPDES or NPDES permit.
- C. This permit does not authorize stormwater discharges associated with construction and/or construction support activity that have been covered under an individual permit or which require coverage under an alternative general permit in accordance with Part 7.10, except stormwater discharges from concrete and asphalt batch plants specified in Part 2.2.A.2.
- D. This permit does not authorize stormwater discharges from construction sites that DEQ determines will cause, have reasonable potential to cause, or contribute to violations of water quality standards, including anti-degradation policy. Where such determinations have been made, DEQ may notify the operator(s) that an individual permit application is necessary in accordance with Part 7.10. However, DEQ may

- authorize coverage under this permit after appropriate controls and implementation procedures designed to bring the discharges into compliance with water quality standards have been included in the SWP3.
- E. This permit does not authorize stormwater discharges, allowable non-stormwater discharges, and stormwater discharge-related activities that
    - 1. are not protective of federal and state listed endangered and threatened species or designated critical habitat.
    - 2. are likely to jeopardize the continued existence of any species that are listed or proposed to be listed as endangered or threatened or result in the adverse modification or destruction of habitat that is designated or proposed to be designated as critical.
    - 3. may cause a prohibited "take" of endangered or threatened species, including significant habitat modification that actually injures a species.
  - F. This permit does not authorize new sources or new discharges of constituents of concern to impaired waters unless otherwise allowable under OAC 252:606 and applicable state law. Impaired waters are those that do not meet applicable water quality standards and are listed on the latest approved Clean Water Act ("CWA") Section 303(d) list. Pollutants of concern are those constituents for which the waterbody is listed as impaired. The 303(d) list of impaired waters can be found in Appendix C of Oklahoma's Integrated Report on the DEQ web site at <https://www.deq.ok.gov/water-quality-division/watershed-planning/integrated-report/>, or the DEQ GIS Map and Data Viewer at <https://gis.deq.ok.gov/maps/>.
  - G. This permit does not authorize discharges of pollutants of concern to impaired waterbodies for which there is an approved total maximum daily load ("TMDL") or a watershed plan incorporated in Oklahoma's Water Quality Management Plan in lieu of a TMDL unless they are consistent with the approved TMDL or watershed plan or local compliance plan. Applicants must comply with the requirements in Part 5.1.F.
  - H. This permit does not authorize the discharge of toxic or hazardous substances or oil resulting from a spill or other release.
  - I. This permit does not authorize the discharge of wastewater from the washout or cleanout of concrete, unless managed by an appropriate control as described in Part 4.4.H.
  - J. This permit does not authorize the discharge of wastewater from the washout or cleanout of stucco, paint, form release oils, curing compounds, and other construction materials.
  - K. This permit does not authorize the discharge of fuels, oils, or other pollutants used in vehicle operation and maintenance.
  - L. This permit does not authorize the discharge of soaps, detergents or solvents used in vehicle and equipment washing.

## 2.4 Historic Preservation

The EPA has determined that DEQ's NPDES permitting activities are not federal undertakings and, therefore, are not subject to review under Section 106 of the National Historic Preservation Act. However, applicants and permittees must comply with the State Antiquities Act (Title 53, Chapter 20, Section 361) where applicable and the Burial Desecration Law (Title 21, Chapter 47, Section 1168.0-1168.6), as well as with any applicable local laws concerning the identification and protection of historic properties.

Applicants and permittees who may receive federal funding or other federal assistance in the completion of their projects must be aware that compliance with Section 106 of the Act may apply. For information about

the Section 106 review process in Oklahoma, Oklahoma properties listed on or eligible for the National Register of Historic Places, and related topics, contact:

State Historic Preservation Office  
Oklahoma Historical Society  
800 Nazih Zuhdi Drive  
Oklahoma City, OK 73105  
(405)521-6249  
<https://www.okhistory.org/shpo/index>

Oklahoma Archeological Survey  
111 East Chesapeake  
Norman, OK 73019  
405/325-7211  
<https://www.ou.edu/archsurvey>

## 2.5 Meeting Eligibility Requirements for Endangered Species

### A. Eligibility Criteria

1. Activities authorized by this permit must avoid unacceptable effects to federal and state listed endangered or threatened (listed) species or designated critical habitats. Direct and indirect effects must be considered. Coverage under this permit is available only if your stormwater discharges, allowable non-stormwater discharges, and discharge-related activities are not likely to
  - a. jeopardize the continued existence of any listed species or result in the adverse modification or destruction of critical habitat, or
  - b. cause a prohibited “take” of endangered or threatened species, including significant habitat modification that actually injures a species, unless such “take” is authorized under Sections 7 or 10 of the Endangered Species Act (“ESA”).
2. Discharge-related activities authorized by this permit include
  - a. activities that cause, contribute to, or result in point source stormwater pollutant discharges, including but not limited to excavation, site development, grading, and other land disturbing activities, and
  - b. measures to control stormwater including the siting, construction, and operation of BMPs to control, reduce, or prevent stormwater pollution.

### B. Eligibility Certification

1. You must certify that you have met eligibility criteria for protection of threatened or endangered species and their critical habitat. Your signed NOI will constitute your certification of eligibility. If the eligibility requirements cannot be met, you may seek coverage under a DEQ individual permit. This eligibility must be evaluated before the NOI is submitted. DEQ strongly recommends that you conduct this evaluation at the earliest possible stage to ensure that measures to protect listed species are incorporated early in the planning process.
2. You must state on the NOI which of the criteria listed in Part 2.5.B.3 you are relying upon for meeting the endangered species eligibility.
3. You must meet one or more of the criteria below for the entire term of coverage under this permit. Failure to continue to meet one of these criteria during the term of the permit will render an applicant ineligible for coverage under this permit. If you are located partially or wholly in an area described in Appendix A then you must meet criterion B, C, D, or E for the term of this permit. If you are not located in the shaded area or watersheds listed in Exhibit I, then you meet the terms of criterion A. The information used to make the eligibility determination must be documented and included as part of the SWP3.
  - a. Criterion A requires that proposed construction site or land disturbing activity is not located within any of the corridors of the federal or state identified aquatic resource of concern (“ARC”), and further investigation is not required.
  - b. Criterion B requires that the proposed construction site or land disturbing activity is located within a corridor of a federal or state identified ARC. Operators must provide and implement

measures to protect the endangered or threatened species or their critical habitat; these measures must be identified in the NOI and described in the facility's SWP3.

- c. Criterion C requires that the applicant use Appendix D to evaluate alternatives of buffer requirements and select equivalent sediment controls or contact DEQ for further consultation if one of those eligibility criteria under Part 2.5.B.3.b, d, or e cannot be met.
- d. Criterion D requires that the applicant's federally approved construction activities are authorized by the appropriate federal or state agency and that authorization addresses the Endangered Species Act Section 7 consultation for the stormwater discharge or stormwater discharge-related activities. Applicants selecting option d must include documentation from U.S. Fish and Wildlife Service ("USFWS") or a qualified biologist that demonstrates Section 7 consultation has been completed. The SWP3 must comply with and be updated to include any conditions resulting from that consultation.
- e. Criterion E requires that the applicant's stormwater discharges and stormwater discharge-related activities are already addressed in another operator's certification of eligibility that includes the applicant's project area. By certifying eligibility under this part, the applicant agrees to comply with applicable measures or controls upon which the other operator's certification was based.

**PART 3 AUTHORIZATION UNDER THIS PERMIT****3.1 Responsibilities of Operators**

Permittees may meet one or both of the operational control components in the definition of “operator” found in Part 1.Y. The criteria within the definition of “operator” may allow for more than one entity to be considered an “operator” at a construction site. Where it is determined to be more efficient or desirable, this permit allows for all construction activities at a site to be covered under a single authorization and a single SWP3 held by a “primary operator.”

**A. Types of Operators**

1. A primary operator is
  - a. the sole operator at a construction site,
  - b. an operator who has obtained permit coverage for discharges over which it has operational control of construction plans and specifications and/or day-to-day construction activities, or
  - c. the operator who has chosen to obtain permit coverage for all discharges from all earth-disturbing activities at a construction site, even if such discharges originate from portions of the site operated by another entity (e.g., secondary operators).
2. A secondary operator, for a construction project that has multiple operators, is an operator who has elected to have the discharges from earth-disturbing activities on a construction site to which he/she has operational control covered by the authorization and SWP3 held by the primary operator rather than obtaining separate permit coverage for those discharges. If the primary operator chooses not to cover the secondary operator’s construction activities or the secondary operator elects not to have their discharges from earth-disturbing activities covered by the primary operator’s authorization, this secondary operator must develop a separate SWP3, submit a separate NOI and obtain separate permit coverage, and comply with all primary operator permit requirements for the portion(s) of the site over which it has operational control.
3. A utility installation operator is an operator who only has operational control over utility installation (e.g., telephone, electric, gas, cable TV, etc.) and who has elected to have the discharges from earth-disturbing activities on a construction site to which he/she has operational control covered by the authorization and SWP3 held by the primary operator rather than obtaining separate permit coverage for those discharges. If the primary operator chooses not to cover the utility installation operator’s construction activities or the utility installation operator elects not to have their discharges from earth-disturbing activities covered by the primary operator’s authorization, this utility installation operator must develop a separate SWP3, submit a separate NOI and obtain separate permit coverage, and comply with all primary operator permit requirements for the portion(s) of the site over which it has operational control.

**B. Responsibilities of a Primary Operator**

The primary operator is ultimately responsible for the runoff from the perimeter of the area(s) over which their authorization covers. Regardless of the reason for the runoff, the primary operator is responsible for ensuring sufficient overall controls for this area.

**1. General Responsibilities**

The primary operator must

- a. develop an SWP3 (prior to submitting an NOI), obtain permit authorization, implement and maintain control measures, and maintain and update the SWP3 for all area(s) of activity covered by the authorization,
- b. be thoroughly familiar with and adhere to provisions of the permit, the NOI, the SWP3 and all BMPs and control measures which apply to all areas of activity covered by the authorization, and
- c. must avoid damaging or interfering with the effectiveness of any BMPs and/or control measures on the site.

**2. Responsibilities Based on Operational Control****a. Operational Control over Constructions Plans and Specifications**

Primary operators with control over construction plans and specifications, including the ability to make modifications to those plans and specifications (e.g., developer, owner, or operator), must ensure that:

- i. The project plans and specifications meet the minimum requirements of this permit.
    - ii. The SWP3 indicates the areas of the project where this operator has control over project plans and specifications (including the ability to make modifications in plans and specifications), and ensure all other operators implementing portions of the SWP3 who may be impacted by any changes to the SWP3 are notified of such modifications in a timely manner and receive a copy of the updated SWP3.
    - iii. The SWP3 indicates the name(s) and authorization number(s) of the parties (primary, secondary, and/or utility installation operators) with operational control over day-to-day activities necessary to ensure compliance with the SWP3 and permit conditions for portions of the project where these parties have control. If these parties have not been identified and do not have a DEQ authorization at the time the SWP3 is initially developed, the permittee with operational control over project plans and specifications shall be the responsible party until such time as the operational control is transferred to another party, the SWP3 is updated, and this new party obtains permit coverage.
  - b. Operational Control Over Day-to-Day Activities  
Primary operators with control over day-to-day activities must ensure that:
    - i. The SWP3, for all portions of the project where they have control, meets the minimum requirements of this permit and identifies the parties (primary, secondary, and utility installation operators) responsible for implementation of control measures.
    - ii. The SWP3 indicates all areas of the project where they have control over day-to-day activities.
    - iii. The SWP3 for all areas where they have control indicates the name(s) and authorization number(s) of the parties with operational control over project plans and specifications (including the ability to make modifications in plans and specifications), if different than the primary operator with control over day-to-day activities.
3. Responsibilities Regarding Secondary Operators
- The primary operator must
- a. identify all secondary operators in the SWP3 and identify the specific areas of the site where they will be active,
  - b. require that secondary operators provide notification to the primary operator and execute any written notification required by the primary operator prior to beginning any earth-disturbing activity, and
  - c. ensure that secondary operators are familiar with and adhere to provisions of the permit, the NOI, the SWP3, and all BMPs and other control measures that apply to their operations through contractor certifications or similar documentation.
  - d. require that secondary operators avoid damaging or interfering with the effectiveness of any control measure on the construction site or notify the primary operator if such occurs.
4. Responsibilities Regarding Utility Installation Operators
- The primary operator must ensure that entities with control over utility installation, including utility companies and their subcontractors,
- a. are covered under the primary operator's NOI, authorization, and SWP3, or have their own separate authorization and SWP3,
  - b. implement BMPs, including those that are protective of endangered species, and
  - c. implement final stabilization requirements.
5. Responsibilities Regarding Terminations
- The primary operator shall not terminate permit coverage until at least one of the following conditions has been met:
- a. All construction, including landscaping and lot development, has been completed, and final stabilization has been achieved.
  - b. All lots are sold and developed, and there are no temporary common controls for subdivision outfalls.
  - c. All construction activity by the primary operator is completed, final stabilization has been achieved on all areas under the control of the primary operator, the remaining undeveloped lots

have been sold to a new operator(s), and a Notification of Change of Ownership (NCO) form(s) for the new operator(s) has been prepared and signed.

- d. A new operator has obtained permit coverage which will include all areas currently covered by the primary operator's authorization.

### 3.2 Obtaining Authorization

- A. Develop a new SWP3<sup>9</sup> or update an existing SWP3 as necessary prior to submitting an NOI to DEQ. A copy of the SWP3 does not have to be submitted to DEQ unless specifically requested by DEQ. However, DEQ may require submittal of a copy of the SWP3 for review at any time. An updated version of the SWP3 must be submitted within 14 days of such a request.
- B. Submit an official NOI (DEQ Form 606-002A) in accordance with the applicable deadline specified in Part 3.5. The NOI must be complete and accurate with all required information and supporting documentation. Only one NOI needs to be submitted to cover all of the operator's activities on a common plan of development or sale (e.g., a separate NOI does not need to be submitted for each separate lot in a residential subdivision or for two separate buildings being constructed at a manufacturing facility, provided the NOI and SWP3 covers each area where the primary operator has operational control). The SWP3 must be implemented upon commencement of construction activities.
- C. Submit the applicable application fee and annual permit fee established in OAC 252:606 OPDES Standards. An invoice of the permit fee due will be sent if the fee is not included with the NOI or upon request.
- D. Upon receipt of the properly completed NOI and application/permit fees, DEQ will process the information and provide an authorization certificate accompanied by a letter of notification. The applicant/primary operator (as well as any secondary or utility installation operators, if applicable) is not authorized to commence earth-disturbing activities or discharge stormwater from construction activities under the terms and conditions of this permit until an authorization covering their construction activities is received from DEQ. DEQ may deny coverage under this permit based on a review of the NOI or other information and require submittal of an application for an individual OPDES permit (see Part 7.10 of this permit).
- E. After issuance of an authorization, an amended NOI shall be submitted by a permittee if circumstances change. When there is a change to the site's primary operator, the new primary operator must submit a new NOI, and the previous primary operator must submit an NOT form as specified in Part 3.6. The following modifications to an NOI form will result in a 14-day review process:
  1. Changes to the name of the primary operator, or addition of an operator (including a secondary or utility installation operator);
  2. Election by the primary operator to no longer cover secondary or utility installation operators under its authorization and SWP3;
  3. Changes to the project or site name;
  4. Increases to the estimated area to be disturbed;
  5. Changes to the name of the receiving water, or additions to the applicable receiving waters;
  6. Changes to eligibility information related to endangered species protection or historic preservation;
  7. Changes to information provided related to the use of chemical treatment at your site

The amended NOI must be submitted at least two days prior to the change or addition and shall include the facility's assigned permit number and a description of the requested change(s). For stormwater discharges from construction projects where the primary operator changes, including instances where an operator (including a secondary or utility installation operator) is added after an authorization has been issued, the new primary operator must submit an NOI at least two days before assuming operational control over site specifications or commencing work on-site. DEQ will provide an acknowledgement by mail or email that the amended NOI has been received and processed. During the 14-day review process, the operator(s) (including secondary and utility installation operators) may continue to operate based on the information provided in the original NOI, but must wait until the review period has ended before

<sup>9</sup> The SWP3 shall cover either the entire site or all portions of the site where the applicant has operational control. A "joint" SWP3 may be developed and implemented as a cooperative effort where there is more than one operator at a site.

commencing or continuing activities on any portion of the site that would be affected by the changes, unless DEQ notifies them that the authorization is delayed or denied.

- F. Permittees must update their SWP3s within seven calendar days to reflect the change(s). An amended NOI cannot be used to:
  1. Decrease the total project area (e.g., area to be disturbed has decreased from 40 acres to 20 acres).
  2. Transfer authorization to another operator.
- G. In the event that a primary operator elects to no longer cover a secondary or utility installation operator's construction activities or a secondary or utility installation operator elects to no longer have their discharges from earth-disturbing activities covered by the primary operator's authorization, the secondary or utility installation operator is no longer authorized to discharge under this permit, and must discontinue its construction activities and discharges until it has developed its own separate SWP3 and obtained separate authorization in accordance with the requirements of Parts 3.2.A-D and the deadline for NOI submittal of Part 3.5.A. In the former case, the primary operator must submit an amended NOI to DEQ as specified in Part 3.2.E, as well as providing written notification to all secondary and utility operators at least two days prior to making the change. In the latter case, the secondary or utility installation operator must provide written notification to DEQ and the primary operator at least two days prior to making the change, and must develop a separate SWP3, submit a separate NOI, and obtain separate permit coverage, and comply with all primary operator permit requirements for the portion(s) of the site over which it has operational control.

### 3.3 Contents of the NOI

The NOI form shall include the following information:

- A. Indicate whether this is a new application, or amendment/modification or renewal of an existing NOI, including your authorization number if this is an amendment/modification or renewal;
- B. Provide the legal name, mailing address, phone number, and email address of the company/firm, public organization, or any other entity operator filing the NOI for permit coverage;
- C. Indicate whether the operator has operational control over plans and specifications and/or day-to-day construction activities;
- D. Provide name, title, phone number, and email address for the operator's point of contact;
- E. Provide the site/project's official name, phone number and street address or general location information (e.g., intersection of State Highway 61 and 34), and SIC Code(s);
- F. Provide the name, title, phone number, and email address for the site/project's point of contact;
- G. Provide the name, title, phone number, and email address for the site/project's consultant, if any;
- H. Provide description of the activity/purpose of the project (i.e., residential subdivision, commercial building, road and/or bridges, wind farm, etc.);
- I. Provide latitude and longitude of the construction project/site at the center of the site (or latitude and longitude at the starting and ending points if it is a linear construction site). Latitude and longitude can be obtained from DEQ's and USGS's websites or other mapping tools;
- J. Provide estimated construction project starting date and ending date. The dates must be provided in MM-DD-YYYY where MM is the month, DD is the date and YYYY is the year;
- K. Provide total area of construction site and estimated area to be disturbed in acres;
- L. Provide total impervious area (pre-construction) and total impervious area construction completed (post-construction) in acres;
- M. Provide post-construction runoff coefficient of the site. The operator may use recommended runoff coefficients in Appendix E of this permit. Average coefficients for composite areas may be calculated on an area-weighted basis from  $C = \sum C_i A_i / \sum A_i$ , where  $C_i$  is the coefficient applicable to the area  $A_i$ ;
- N. Describe the nature of fill material and existing data describing soils (i.e., coarse-grained soils: gravels, sands, or fine-grained soils: silts and clays, silts and clays, and highly organic soils etc.) Operator may use soil classification chart in Attachment A of Appendix D to determine the types of the soils on the site;
- O. Indicate whether this site/project is part of common plan of development or sale;
- P. Indicate whether there are other operators associated with this site/project and, if so, whether: a) all operators will be covered under this authorization; b) all, or some, operators will be obtaining separate authorizations and will be documented in the SWP3; and/or, c) new owner/operators will be obtaining

- a separate authorization and will be documented using Form 605-NCO Notification of Change of Ownership (NCO) which will be kept with the SWP3.
- Q. Indicate whether the site/project discharges stormwater to a Municipal Separate Storm Sewer System (MS4);
  - R. Identify all the receiving waterbodies from the sites that receive stormwater discharges, including names of the waterbodies;
  - S. Indicate whether the receiving waterbodies are included on DEQ's latest approved 303(d) list of impaired waterbodies, including the pollutant(s) for which the waterbody is impaired;
  - T. Indicate whether the stormwater discharges drain to a waterbody or watershed with an approved or established TMDL, watershed plan in lieu of a TMDL, or local compliance plan. Additional site-specific requirements may be applicable if the site is located in such waterbody or watershed;
  - U. Indicate endangered species eligibility by identifying whether or not the construction site or land-disturbing activity is within the specified corridor of a federal or state ARC; whether Appendix D will be used to develop equivalent sediment controls; whether you are required to have an Endangered Species Act Section 7 consultation process; and/or whether you are relying on another permittee's certification of eligibility and are agreeing to comply with the conditions of that certification.
  - V. Confirm that the SWP3 has been prepared and is available on-site for review;
  - W. Indicate whether this operator is registered with the Secretary of State of Oklahoma;
  - X. Indicate whether this site or project will have construction support activities;
  - Y. Describe the proposed measures, including BMPs, to control pollutants in stormwater discharges during construction, including a brief description of applicable erosion and sediment control requirements; and
  - Z. Describe the proposed measures to control pollutants in stormwater discharges that will occur after construction operations have been completed, including a brief description of applicable erosion and sediment control requirements.
  - AA. Attach a legible site map showing your facility location and boundaries, including support activities, and all waters of the state within one mile of the site, and indicate whether the application fee and first-year permit fee are attached or have already been paid.
  - AB. Complete the certification/signature block.

### 3.4 High Priority Construction Sites

This permit identifies high priority construction sites based on total disturbed acreage and receiving waters. High priority construction sites are sites that

- A. are 40 disturbed acres or greater, or
- B. discharge within one mile of a receiving waterbody which is identified by DEQ on the latest Section 303(d) list as impaired (i.e., not meeting water quality standards) for sediment and/or turbidity, or
- C. are located within an ARC, ORW, or waterbody with a TMDL or watershed plan<sup>10</sup>.

For discharges that enter a separate storm sewer system prior to discharge, the first water of the state to which you discharge is the waterbody that receives the water from the storm sewer system. In such a case, you are considered to discharge to the impaired water if your site is located within one mile of the separate storm sewer system outfall that discharges to the impaired water. Separate storm sewer systems include both MS4s and non-MS4s. Separate storm sewers do not include combined sewer systems or sanitary sewer systems.

You are not considered to discharge to an impaired water if your site or discharge point is located within one mile of an impaired receiving waterbody, but the point of discharge (or the separate storm sewer outfall if discharging to a separate storm sewer system) is outside the watershed of this waterbody.

### 3.5 Deadlines for NOI Submittal

- A. Operators of new construction projects/activities that commence after the effective date of this permit must submit an NOI at least 14 days prior to commencing construction activities.

<sup>10</sup> This refers to TMDLs or watershed plans that assign specific requirements to stormwater discharges associated with construction activities (e.g. Lake Thunderbird Report for Nutrient, Turbidity and Dissolved Oxygen TMDLs).

- B. Existing operators of on-going construction projects/activities that have active authorizations for coverage under the 2017 CGP coverage upon its expiration must submit an NOI within 90 days of the effective date of this permit. Authorization under the 2017 permit will be administratively extended for a period not to exceed 90 days from the effective date of this permit. The existing SWP3 must be updated to comply with this permit prior to the NOI submittal. If the permittee is eligible to submit an NOT (e.g., construction is finished and final stabilization has been achieved) before the 90th day, a new NOI is not required to be submitted. Operators must remain in compliance with the requirements of the 2017 permit until a new authorization is received or an NOT is submitted and accepted by DEQ.
- C. Operators of on-going construction projects/activities as of the effective date of this permit that did not receive authorization to discharge under the 2017 permit are not authorized to discharge and are in violation of this permit upon its effective date. They must discontinue construction activities and discharges until they have submitted an NOI and obtained coverage under this permit. Prior to NOI submittal, an SWP3 must be developed and implemented to comply with the requirements of this permit. DEQ reserves the right to take appropriate enforcement action for any unpermitted activities or discharges that may have occurred between the time construction commenced and the authorization is granted.

### 3.6 Terminating Coverage

- A. A complete NOT (DEQ Form 606-003) must be submitted to DEQ within 30 days if one or more of the following conditions have been met:
  - 1. All soil disturbing activities have been completed, final stabilization has been achieved on all portions of the site for which the permittee is responsible (including, if applicable, returning agricultural land to its pre-construction agricultural use) and all temporary erosion and sediment control measures have been removed.
  - 2. For residential subdivisions only: all soil disturbing activities have been completed, final stabilization has been completed, the ownership of all lots or sections has been transferred to new owners, the permittee is no longer responsible for continuing construction activities for the subdivision, and all temporary erosion and sediment control measures have been removed. The permittee shall not terminate their permit coverage until the new owners/operators of the individual lots within the larger common plan of development or sale are notified of their permitting requirements. The permittee must complete an NCO which shall be signed by both the permittee and new owner and documented in the permittee's SWP3.
  - 3. Another primary operator has assumed control over all areas of the site that have not been finally stabilized. The NOT must be submitted with the new operator's NOI.
- B. DEQ will review the NOT for completeness and accuracy and may, at its discretion, inspect the site for which the NOT was submitted within 30 days of receipt of the NOT. Upon completing such inspection, DEQ will notify the permittee of any needed changes to the site conditions, or that the site has met the termination requirements under this permit. The permittee is responsible for meeting the terms of this permit until DEQ's termination letter has been issued. Only one NOT form can be submitted to DEQ by the same owner/operator within a 90-day period. Additional compliance inspections may occur within this 90-day period at the discretion of DEQ.

### 3.7 Contents of the NOT

- A. Identify the OKR10 permit number for the stormwater discharge on the site;
- B. Indicate whether termination is being requested because: a) a new owner or operator has taken over responsibility for the facility/site/project and has submitted an NOI for permit coverage; b) all construction activities have been completed and met all other requirements under OKR10 permit, including final stabilization, on all portions of the site; or c) you have obtained coverage under an individual or alternative general permit for all stormwater discharges.
- C. Provide the legal name, mailing address, phone number, and email address of the operator submitting the NOT;
- D. Indicate whether, if DEQ elects to perform a termination inspection, you wish to be notified when the inspection occurs and, if so, provide contact information;

- E. Provide the legal name of the site or project and address (or a description of the general location if no street address is available) of the construction site/project;
- F. Provide latitude and longitude of the entrance to the construction site/project. Latitude and longitude can be obtained online at DEQ's, or USGS's websites or from other mapping tools;
- G. If applicable, provide the legal name, mailing address, phone number, and email address of the new operator.
- H. Include a copy of the updated site map showing all completed and final plans and projects (i.e., aerial images or general site maps with project extents marked, including stabilized areas of concrete or asphalt batch plants, equipment staging yards, stockpile, borrow areas, wash-out areas, previously disturbed areas, etc.); and
- I. If applicable, provide a copy of the NCO form (see Part 3.6.A.2) for each new owner/operator to whom you have sold a portion of the site. Where indicated on your NOT and NCO forms, you must include the new OKR10 owner/operator's contact information, including their name, street address, phone number and email address. Each new owner/operator is also required to prepare and submit an NOI to DEQ for review. If applicable, you must submit all NCOs to DEQ prior to submittal of the NOT or submit the NOT along with all NCOs that have been prepared during the ownership transition; and
- J. Complete the certification/signature block.

### 3.8 Where to Submit

All written correspondence concerning this permit, including the submittal of NOIs and NOTs, shall be sent to the following address, fax or email:

Stormwater Unit of Environmental Complaints and Local Services ("ECLS")  
Department of Environmental Quality ("DEQ")  
707 North Robinson Ave., P.O. Box 1677  
Oklahoma City, OK 73101-1677

(fax) to (405) 702-6226

(email) to [ECLS-StormwaterPermitting@deq.ok.gov](mailto:ECLS-StormwaterPermitting@deq.ok.gov)

Once DEQ's online NOI submission tool is made available, NOIs may be completed and submitted electronically using that tool.

All documents shall be submitted in accordance with all state and federal reporting requirements.

**PART 4 EFFLUENT LIMITATIONS**

The stormwater control requirements in this part apply to all discharges from construction sites, including construction support activities (e.g., concrete or asphalt batch plants), eligible for coverage under this permit. These requirements apply the national effluent limitations guidelines and new source performance standards found at 40 C.F.R. §§ 450.21 – 450.24.

**4.1 Design, Installation, Implementation and Maintenance Requirements**

You must design, install, implement, and maintain effective BMPs as required in Parts 4.2, 4.3 and 4.4 that minimize the discharge of pollutants from construction activities.

**A. Design Requirements**

You must address the following factors in designing your stormwater controls:

1. The expected amount, frequency, intensity, and duration of precipitation.
2. Stormwater volume and velocity must be controlled to minimize soil erosion and pollutant discharges.
3. The amount of soil exposed must be minimized during construction activity to minimize soil erosion and pollutant discharges.
4. The nature of stormwater runoff and run-on at the site, including factors such as expected flow from impervious surfaces, slopes, and site drainage features. You must design stormwater controls to control both peak flowrates and total stormwater volume to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.
5. Soil characteristics, including the range of soil particle sizes expected to be present on the site.

**B. Installation Requirements**

You must ensure that all BMPs are installed in accordance with the manufacturer's recommendations or good engineering practices.

**C. Maintenance Requirements**

You must ensure that all BMPs, equipment, and systems remain in effective operating condition and are protected from activities that would reduce their effectiveness. This can be accomplished by conducting routine inspection, testing, maintenance, and corrective action/repair as required by Parts 5.4 and 5.5 to avoid breakdowns or failures that may result in discharges of pollutants to surface waters. Routine maintenance, work that does not require significant repair or replacement, must be initiated immediately after discovering the problem, and completed by the close of the next work day.

**4.2 Sediment and Erosion Controls****A. Direct Discharges from Stormwater Controls to Vegetated Areas**

Direct discharges from your stormwater controls to vegetated areas of your site to increase sediment removal and maximize stormwater infiltration to reduce pollutant discharges, including any natural buffers established under Parts 4.2.B and 4.6.B, unless infeasible. Use velocity dissipation devices if necessary to prevent erosion when directing stormwater to vegetated areas.

**B. Provide and Maintain Natural Buffers and Equivalent Erosion and Sediment Controls**

When any waters of the state are located on or immediately adjacent to the site (refer to Appendix D, Figure D-1), you must maintain a natural buffer zone or equivalent erosion and sediment controls from any named or unnamed receiving streams, creeks, rivers, lakes or other water bodies. The minimum width of the buffer is outlined in Table 4-1. If only a portion of the natural buffer is less than the minimum required width, you are only required to implement erosion and sediment controls that achieve the sediment load reduction equivalent to the portion that is not retained (refer to Appendix D, Figure D-2).

**Table 4-1 Minimum Required Natural Buffer Widths**

Type of Receiving Water	Type of Construction Site	
	Standard	High Priority
Perennial or intermittent streams, creeks, rivers or lakes	50 feet	100 feet
Ephemeral streams or drainages	50 feet	50 feet
Road ditches, county ditches, stormwater conveyance channels, storm drain inlets or sediment basins/impoundments	None	None

To ensure that the water quality protection benefits of the buffer are retained during construction, you must retain as much natural buffer as possible and you are prohibited from conducting any earth-disturbing activities within the buffer during permit coverage. You must ensure that all discharges from the area of earth disturbance to the natural buffer are first treated by the site's erosion and sediment controls and, if necessary to prevent erosion caused by stormwater flows within the buffer, you must use velocity dissipation devices.

- To comply with this requirement you must provide or implement and maintain one of the following:
  - A 100-foot or 50-foot undisturbed natural buffer.
  - An undisturbed natural buffer that is less than 100-feet or 50-feet and is supplemented by additional erosion and sediment controls that achieve the sediment load reduction equivalent to the amount of undisturbed buffer which cannot be maintained. A description of why it is infeasible to provide and maintain the full 100-foot or 50-foot undisturbed natural buffer must be included in your SWP3.
  - Erosion and sediment controls that achieve the sediment load reduction equivalent to a 100-foot or 50-foot undisturbed natural buffer. A description of why it is infeasible to provide and maintain an undisturbed natural buffer of any size must be included in your SWP3.
- Where you are retaining a buffer of any size, the buffer should be measured perpendicularly from one of the following points, whichever is further landward from the water:
  - The ordinary high water mark of the water body (refer to Appendix D, Figure D-3), defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
  - The edge of the stream or river bank, bluff, or cliff, whichever is applicable (refer to Appendix D, Figure D-4).
- In order to select controls that provide equivalent sediment removal rates you may complete your own calculations<sup>11</sup> or follow the steps outlined in Appendix D.
- You are not required to comply with the requirements of Part 4.2.B if your site meets one of the following:
  - Dredge and fill activity authorized under a current CWA Section 404 permit.
  - Construction of water-dependent structure or water access area (e.g., pier, boat ramp, trail).
  - There is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and any waters of the state located within 100-feet or 50-feet of the site.
  - Where no natural buffer exists due to preexisting development disturbances (e.g., structures, impervious surfaces) that occurred prior to the initiation of planning for the current development of the site, unless you will remove portions of the preexisting development.

This exemption only applies to the area where the qualifying construction activity is taking place or where the preexisting development is located and does not apply to the construction site in its entirety.

The requirement to provide and maintain a natural buffer or its equivalent is independent of (and does not substitute for) the requirement to install perimeter controls along areas of the site that will receive stormwater discharges. Additionally, this requirement is not intended to interfere with any other ordinance, regulation, statute or other provision of the law.

<sup>11</sup> There are a variety of models available that can be used to support your calculation, including USDA's RUSLE-series programs and the WEPP erosion model, SEDCAD, SEDIMOT, or other models.

C. Install Perimeter Controls

Install sediment controls along those perimeter areas of your site that will receive stormwater from earth-disturbing activities. For linear construction sites where perimeter controls are infeasible (e.g., due to limited or restricted rights-of-way), you must maximize the use of other controls as necessary to minimize pollutant discharges to perimeter areas of the site and document in your SWP3 why it is impracticable in other areas of the project. Routine maintenance includes removing sediment before it has accumulated to one-half of the above-ground height of any perimeter control.

D. Minimize Sediment Track-Out

You must minimize the sediment track-out onto streets, other paved areas, and sidewalks from vehicles exiting your construction site. To comply with this requirement, you must:

1. Restrict vehicle use to properly designated exit points.
2. Use appropriate stabilization techniques at all points that exit onto paved roads.
3. Implement additional track-out controls as necessary to ensure that sediment removal occurs prior to vehicle exit.
4. Where sediment has been tracked-out from your site onto the surface of paved streets, sidewalks or other paved areas outside of your site, you must remove the deposited sediment by the end of the same work day in which the track-out occurs or by the end of the next work day if track-out occurs on a non-work day. You must remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out sediment into any stormwater conveyance (unless it is connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface waters of the state.

Stabilization is not required for exit points at linear utility construction sites if other controls at the exit point are provided to minimize sediment track-out. Examples of other exit controls include, but are not limited to, preventing the use of exit points during wet periods; minimizing exit point use by keeping vehicles on site to the extent possible; limiting exit size to the width needed for vehicle and equipment usage; and avoiding establishing exit points in environmentally sensitive areas.

E. Control Discharges from Stockpiled Sediment or Soil

For any stockpiles or land clearing debris composed in whole of sediment or soil, you must comply with the following requirements:

1. Locate the piles outside of any natural buffers established under Parts 4.2.B and 4.6.B and physically separated from any stormwater conveyances, drain inlets, and area where stormwater flow is concentrated.
2. Install a sediment barrier along all down-gradient perimeter areas.
3. Provide cover or appropriate temporary stabilization to avoid direct contact with precipitation or to minimize sediment discharge in accordance with Part 4.3.
4. Do not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water.
5. Unless infeasible, contain and securely protect from wind.

F. Minimize Dust

In order to avoid pollutants from being discharged into surface waters, to the extent feasible, you must minimize the generation of dust through the appropriate application of water or other dust suppression techniques.

G. Minimize the Disturbance of Steep Slopes

You must minimize the disturbance of steep slopes (i.e., slopes of 40% or greater). If it is not feasible to avoid disturbance of steep slopes, you must:

1. Divert concentrated or channelized flows of stormwater away from and around areas of disturbance on steep slopes.
2. Use specialized erosion and sediment controls for steep slopes.
3. Use stabilization practices designed to be used on steep slopes. You must comply with the stabilization requirements as required in Part 4.3.

- H. Preserve Topsoil  
You must preserve native topsoil on your site, unless infeasible; you must stockpile and reuse it in areas that will be stabilized with vegetation if applicable.
- I. Minimize Soil Compaction  
In areas of your site where final vegetative stabilization will occur or where infiltration practices will be installed, you must either
1. restrict vehicle and equipment use in these locations to avoid soil compaction; or
  2. prior to seeding or planting areas of exposed soil that have been compacted, use techniques that condition the soils to support vegetative growth, if necessary.
- J. Protect Storm Drain Inlets  
If you discharge to any storm drain inlet that carries stormwater flow from your site directly to surface water (and it is not first directed to a sediment basin, sediment trap, or similarly effective control), and you have the authority to access the storm drain inlet, you must comply with the following requirements:
1. Install inlet protection measures that remove sediment from your discharge prior to entry into the storm drain inlet.
  2. Clean, or remove and replace, the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, you must remove the deposited sediment by the end of the same work day in which it is found or by the end of the following work day if removal by the same work day is not feasible.
- K. Constructed Stormwater Conveyance Channels  
Design channels to avoid unstabilized areas on the site and to reduce erosion, unless infeasible, and minimize erosion of channels and their embankments, outlets, adjacent streambanks, slopes, and downstream waters during discharge conditions through the use of erosion controls and velocity dissipation devices within and along the length of any constructed stormwater conveyance channel, and at any outlet to provide a non-erosive flow velocity.
- L. Install Sediment Basins/Impoundments  
Sediment basins may also be referred to as sediment ponds or impoundments, but will be referred to hereafter as sediment basins.
1. Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide a non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g., no significant changes in the hydrological regime of the receiving water).
  2. For common drainage locations<sup>12</sup> that serve an area with 10 or more acres disturbed at one time (or five acres if you discharge from a high priority construction site), temporary (or permanent) sediment basin(s) must be implemented where feasible.
    - a. The sediment basin(s) must comply with the following:
      - i. Sediment basin(s) must provide storage for either the calculated volume of runoff from a two-year, 24-hour storm, or 3,600 cubic feet per disturbed acre drained, whichever is greater.
      - ii. When discharging from sediment basin(s), utilize outlet structures that withdraw water from the surface, unless infeasible, to minimize the discharge of pollutants.
      - iii. Prevent erosion of the sediment basin and the inlet/outlet structures using erosion controls and velocity dissipation devices.
      - iv. Sediment basins must be situated outside of surface waters and any natural buffers established under Parts 4.2.B and 4.6.A.
      - v. Remove accumulated sediment to maintain at least 1/2 the design capacity and conduct all other appropriate maintenance to ensure the sediment basin remains in effective operating condition.
    - b. When determining whether installing sediment basin(s) is feasible, you may consider factors such as site soils, slope, available area on site, etc. In any event, you must consider public safety,

<sup>12</sup> When computing the number of acres draining into a common location, it is not necessary to include flows from off-site areas, or flows from onsite areas that are either undisturbed or have undergone final stabilization.

especially as it relates to children, as a design factor for the sediment basin(s) and alternative sediment controls shall be used where site limitations would preclude a safe design. For drainage locations that serve 10 or more disturbed acres at one time and where temporary sediment basin(s) or equivalent controls are not attainable, smaller sediment basins and/or sediment traps should be used. Where neither sediment basin(s) nor equivalent controls are attainable due to site limitations, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down-slope boundaries of the construction area and for those side-slope boundaries deemed appropriate as dictated by individual site conditions. DEQ encourages the use of a combination of sediment and erosion control measures to achieve maximum pollutant removal.

3. For common drainage locations<sup>12</sup> serving less than 10 acres disturbed at one time (or five acres if you discharge from a high priority construction site), smaller sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down-slope boundaries (and for those side-slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area unless sediment basin(s) providing overall storage for a calculated volume of runoff from a two-year, 24-hour storm or 3,600 cubic feet of storage per acre drained, whichever is greater, is provided. DEQ encourages the use of a combination of sediment and erosion control measures to achieve maximum pollutant removal.

**M. Dewatering Practices**

You are prohibited from discharging groundwater, spring water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation associated with a construction activity, unless such waters are first effectively managed by appropriate controls. Uncontaminated clear dewatering water can be discharged without being routed to a control. You must also meet the following requirements for dewatering activities:

1. Do not discharge visible floating solids or foam.
2. Use an oil-water separator or suitable filtration device that is designed to remove oil, grease, or other products if dewatering wastewater is found to contain these materials.
3. To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. In no case shall surface waters be considered part of the treatment area.
4. At all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 4.2.K.
5. With backwash water, either haul away for disposal or return it to the beginning of the treatment process.
6. Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.

**4.3 Stabilization**

"Temporary stabilization" refers to the stabilization of exposed portions of the site to provide temporary cover during the establishment and growth of vegetation, and/or in areas where earth-disturbing activities will occur again in the future. "Final stabilization" refers to the stabilization of exposed portions of the site using practices that provide permanent cover and qualify the permittee for permit termination. Temporary and permanent stabilization must be implemented in accordance with this part.

**A. Stabilization Deadlines**

1. Initiate the installation of stabilization measures immediately in any disturbed areas on any portion of the site where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days<sup>13</sup>.
2. Complete the installation of stabilization measures as soon as practicable, but no later than 14 calendar days after stabilization measures have been initiated, or seven calendar days if you discharge from a high priority construction site.
3. If using vegetative stabilization, immediately after seeding or planting the area to be stabilized, you must install stabilization measures to provide effective cover to the area while vegetation is becoming established.

<sup>13</sup> For concrete and/or asphalt batch plants, final stabilization must be initiated upon the completion of all industrial activities.

4. If using non-vegetative stabilization, you must install or apply all such measures to provide effective cover for such exposed portions of your site.
- B. Stabilization Criteria
1. If using vegetative stabilization, temporary and final stabilization measures must provide uniform (i.e., evenly distributed without large bare areas<sup>14</sup>) cover that provides 70% or more of the cover that is provided by vegetation native to the site<sup>15</sup>. When background vegetation covered less than 100% of the ground prior to commencing earth-disturbing activities, the 70% coverage criteria is adjusted as in following example: if vegetation covered 50% of the ground prior to construction, then the requirement would be to provide a total cover at final stabilization of 70% of 50% ( $0.70 \times 0.50 = 0.35$ ), or 35% of the site. If using vegetative stabilization, final stabilization occurs when vegetation has been established and rooted or anchored in place.
  2. If using non-vegetative controls (e.g., hydro-mulch, erosion control blankets, riprap, geotextiles, and gabions) to stabilize exposed portions of your site, or if using such controls to temporarily protect areas that are being seeded and planted, you must provide equivalent non-vegetative stabilization measures to provide effective cover for such exposed portions of your site.
  3. Final stabilization in residential construction, final stabilization occurs when either of the following criteria is met:
    - a. The homebuilder has completed final stabilization as specified above; or
    - b. The homebuilder has established temporary stabilization for an individual lot prior to occupation of the home by the homeowner and informed the homeowner of the need for, and benefits of, final stabilization.
  4. Final stabilization in construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land) may be accomplished by returning the disturbed land to its pre-construction agricultural use. This does not apply to disturbed areas that were not previously used for agricultural activities, such as buffer strips immediately adjacent to waters of the state and areas that are not being returned to their pre-construction agricultural use.

#### 4.4 Pollution Prevention

- A. General Pollution Prevention Requirements
- Implement procedures to minimize exposure to precipitation and stormwater and to prevent litter, construction material and chemicals from becoming a pollutant source for stormwater discharges. This applies to the storage, handling, application and disposal of chemicals and materials such as:
- Soaps, detergents and solvents.
  - Pesticides, herbicides, insecticides and fertilizers.
  - Diesel fuel, oil, hydraulic fluid and other petroleum products.
  - Hazardous or toxic waste.
  - Stucco, paint, concrete, form release oils, curing compounds and other chemicals.
  - Construction and landscape materials.
  - Construction and domestic waste such as building materials and products, packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, and concrete.
  - Sanitary waste.
- B. Implement procedures to prevent litter, construction material and chemicals from becoming a pollutant source for stormwater discharges.
1. Spill Prevention and Response
 

Implement preventive measures such as barriers between material storage and vehicle/equipment traffic areas. Implement procedures for expeditiously stopping, containing, and cleaning up leaks, spills and other releases, including fuels, oils and other pollutants used for equipment and vehicle operation and maintenance. Use drip pans and absorbents under or around leaky vehicles. Ensure

<sup>14</sup> Large bare area is defined as an area with 10 ft<sup>2</sup> or more with no perennial vegetative cover established.

<sup>15</sup> If the site has been disturbed from previous development, or preconstruction conditions were not documented, the cover provided by vegetation native to local undisturbed areas will be used. If undisturbed areas cannot be identified, the existing surrounding conditions will be evaluated (e.g., landscaping or impervious surfaces).

adequate supplies are available at all times to handle spills, leaks and disposal of any chemicals or materials. Clean up leaks, spills and contaminated surfaces immediately using dry clean-up methods and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Eliminate the source of the leak or spill to prevent a discharge or a furtherance of an ongoing discharge.

2. **Emergency Spill Notification**  
You are prohibited from discharging a toxic or hazardous substance or oil from a spill or other release, consistent with Part 2.3.H of this part. This permit does not relieve the permittee of the reporting requirements of 40 C.F.R. Parts 110, 117 and 302. Where a leak, spill, or other release containing a toxic or hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 C.F.R. Parts 110, 117, or 302 occurs during a 24-hour period, you must notify the NRC at (800) 424-8802 or, in the areas of Oklahoma, call the DEQ's Hotline at (800)522-0206 as soon as you have knowledge of the discharge. You must also, within seven calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release. Local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies.
3. **Minimize Exposure**  
Store chemicals in water-tight containers. Provide cover to prevent chemical containers and materials from coming into contact with precipitation and stormwater, or provide secondary containment or a similarly effective means to prevent the discharge of pollutants.
4. **Good Housekeeping**  
During each workday, clean up and dispose of waste in designated waste containers. Provide waste containers (e.g., dumpster or trash receptacle) of sufficient size and number to contain construction and domestic wastes. Keep waste container lids closed during precipitation events when not in use, when there is a significant chance of precipitation (forecasted), and/or the site is inactive or work is not in progress. Waste containers must be covered at the end of daily work shifts and when workers are not present. For waste containers that do not have lids and could leak, provide cover to minimize exposure of wastes to precipitation or a similarly effective means designed to minimize the discharge of pollutants. Clean up immediately if containers overflow.
5. **Chemical Applications**  
Comply with all application and disposal requirements on the pesticide, herbicide, insecticide, fertilizer, or other chemical manufacturer's label.
- C. **Equipment and Vehicle Washing**  
Provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters prior to discharges. Ensure there is no discharge of soaps, detergents, or solvents in equipment and vehicle wash water.
- D. **Fertilizers Containing Nitrogen or Phosphorus**  
Minimize discharges of fertilizers containing nitrogen or phosphorus by complying with the following requirements:
  1. Apply at a rate and in amounts consistent with manufacturer's specifications.
  2. Apply at the appropriate time of year for your location, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth.
  3. Avoid applying before heavy rains that could cause excess nutrients to be discharged.
  4. Never apply to frozen ground.
  5. Never apply to stormwater conveyance channels with standing or flowing water.
  6. Follow all other federal, state, tribal and local requirements regarding fertilizer application.
- E. **Hazardous or Toxic Waste or Oil**
  1. Separate hazardous or toxic waste or oil from construction and domestic waste.
  2. Store waste in sealed containers which are constructed of suitable materials to prevent leakage and corrosion, and which are labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable federal, state, or local requirements.

3. Provide appropriately-sized secondary containment for all containers that will be stored outside to prevent spills from being discharged, or provide a similarly effective means designed to prevent the discharge of pollutants from these areas.
  4. Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended methods of disposal and in compliance with federal, state, and local requirements.
- F. PFAS Management
1. Implement measures to minimize discharges of PFAS during emergency firefighting activities and post-emergency activities, including clean-up.
  2. Establish specific protocols for minimizing the resuspension, conveyance, and discharge of PFAS, both during normal operations and during all maintenance and remediation activities.
  3. Document all activities undertaken in fulfillment of Parts 4.4.F.1-2 in the SWP3.
- G. Sanitary Waste
- Position portable toilets so that they are secure and will not be tipped or knocked over, and are located away from waters of the state and stormwater inlets or conveyances including streets and roadways.
- H. Washing of Applicators and Containers
- This requirement applies to stucco, paint, concrete, form release oils, curing compounds, and other chemicals.
1. Direct all wash water into a leak-proof container or leak-proof pit. The container or pit must be designed so that no overflows can occur due to inadequate sizing or precipitation.
  2. Do not dump liquid wastes in storm sewers.
  3. Dispose of liquid wastes in accordance with applicable requirements in Part 4.4.B or E.
  4. Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes in Part 4.4.B.
  5. Clean up immediately if there is an overflow or if a discharge occurs outside of the leak-proof container or pit.
  6. Locate any washout or cleanout activities as far away as possible from surface waters and stormwater inlets or conveyances, and, to the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas.

#### 4.5 Numeric Technology-Based Effluent Limitations

If you have discharges of stormwater from asphalt batch plants, you must comply with the limitations and monitoring requirements required in Appendix C. The numeric effluent limitations in the following Table 4-2 apply to stormwater discharges associated with any activities for asphalt batch plants, but not to concrete batch plants.

**Table 4-2 Numeric Effluent Limitations for Asphalt Batch Plants**

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Concentration (mg/l unless otherwise specified)		Frequency	Sample Type
	Monthly Avg.	Daily Max.		
Total Suspended Solids (TSS) [00530]	15	23	1/year	Grab
Oil and Grease	10	15	1/year	Grab
pH (standard units) [00400]	6.5-9.0		1/year	Grab

If the project lasts less than one year, you must collect at least one sample. Also, you must comply with quarterly visual monitoring and annual numeric effluent limitation monitoring, and document those results as specified in your SWP3 (see Appendix C).

Monitoring for compliance with the above numeric effluent limitations must be conducted in accordance with test procedures approved under 40 C.F.R. Part 136, including holding time and documentation requirements, and samples must be analyzed by an accredited laboratory in accordance with OAC 252:301. Where more than one test procedure is approved for the analysis of a pollutant or pollutant parameter, the

test procedure must be sufficiently sensitive to meet the minimum quantification levels (MQLs) established in OAC 252:690 or, where an MQL has not been established in OAC 252:690, to quantify the amount of pollutant present at or below the level of the above numeric effluent limitations.

#### 4.6 Water-Quality Based Effluent Limitations for High Priority Construction Sites

- A. If your construction site is considered a high priority construction site, your stormwater discharges must be controlled as necessary to meet applicable water quality standards. Operators seeking coverage under this permit shall not cause, have the reasonable potential to cause, or contribute to a violation of a water quality standard. Where a discharge is already authorized under this permit and is later determined to cause, have the reasonable potential to cause, or contribute to the violation of an applicable water quality standard, DEQ will notify the operator of such violation(s). The permittee shall take all necessary actions to ensure future discharges do not cause, have the reasonable potential to cause, or contribute to the violation of a water quality standard, and document these actions in the SWP3. If violations remain or re-occur, then coverage under this permit may be terminated by DEQ, and an alternative general permit or individual permit may be issued. Compliance with this requirement does not preclude any enforcement activity as provided by the CWA for the underlying violation. If such violation is determined, DEQ may require you to:
1. Develop a supplemental BMP action plan describing SWP3 modifications to address adequately the identified water quality concerns;
  2. Submit valid and verifiable data and information that are representative of ambient conditions and indicate that the receiving water is attaining water quality standards; or
  3. Cease discharges of pollutants from construction activity and submit an alternative general permit or individual permit application.
- B. All high priority construction sites must comply with the following:
1. **Natural Buffer Requirements**  
You must ensure that a vegetated buffer zone of at least 100 feet is retained or successfully established/planted between the area disturbed and all perennial or intermittent streams. A vegetated buffer zone of at least 50 feet must be retained or successfully established/planted between the areas disturbed during construction and all ephemeral streams or drainages. If the nature of the construction activity or the construction site makes a buffer impossible, you must provide equivalent controls. See Appendix D for information to assist you in developing equivalent controls.
  2. **Sediment Basin Requirements**  
You are required to comply with the requirements as specified in Parts 4.2.L for drainage locations serving five or more acres disturbed at one time.
  3. **Stabilization Requirements**  
You are required to comply with the stabilization requirements as specified in Part 4.3 within seven calendar days after the temporary or permanent cessation of earth-disturbing activities.
  4. **Site Inspection Requirements**  
You must conduct site inspections once every seven calendar days at a minimum, and within 24 hours of a storm event of 0.5 inches or greater or within 24 hours of a discharge caused by snowmelt.
  5. **Corrective Actions**  
If the inspection or visual examination results indicate any permit violations, you must implement the corrective actions required in Part 5.5.

**PART 5 STORMWATER POLLUTION PREVENTION PLAN (SWP3)****5.1 General Requirements**

- A. An SWP3 must be prepared prior to submission of an NOI. The SWP3 must be kept up-to-date throughout coverage under this permit. If an SWP3 was prepared under the previous permit, the operator must review and update the SWP3 to ensure that requirements of this permit are addressed prior to submitting an NOI for coverage under this permit.
- B. SWP3s shall be prepared by a qualified person and in accordance with good engineering practices. Use of a licensed professional engineer ("PE") for SWP3 preparation is not required by the permit. However, if any part of the SWP3 involves the practice of engineering<sup>16</sup>, then those engineering practices and designs are required to be prepared by a licensed professional engineer. The SWP3 shall identify potential sources of pollution that may reasonably be expected to affect the quality of stormwater discharges from the construction site. The SWP3 shall describe and ensure the implementation of practices that will be used to reduce the pollutants in stormwater discharges associated with construction activity at the construction site and assure compliance with the terms and conditions of this permit.
- C. When developing SWP3s, applicants must follow the procedures in Part 2.5 to determine whether listed endangered or threatened species or critical habitat would be affected by the applicant's stormwater discharges or stormwater discharge-related activities. Any information on whether listed species or critical habitats are found in proximity to the construction site must be included in the SWP3. The SWP3 must also include documentation required to support your eligibility with regard to the protection of historic properties. Any terms or conditions that are imposed under the eligibility requirements of Parts 2.1 and 2.5 or the water quality-based effluent limitations of Part 4.6 to protect listed species or critical habitat from stormwater discharges or stormwater discharge-related activities must be incorporated into the SWP3. Permittees must implement the applicable provisions of the SWP3 required under this part as a condition of this permit.
- D. If multiple primary operators are associated with the same site, a single "joint SWP3" may be developed covering all operators at the site. However, each operator is responsible for compliance and updates of the SWP3 and each must have access to the most updated SWP3. Operators must also ensure directly or through coordination with other operators, that their activities do not compromise any other operators' controls and/or any shared controls.
- E. If your construction site discharges within one stream mile into a receiving water which has been listed on the Clean Water Act 303(d) list of impaired waters, and your discharges contain the pollutant(s) for which the waterbody is impaired, you must document in your SWP3 how the BMPs and other controls selected for your site will control the discharge of the pollutant(s) of concern. If Part 4.6 applies to your discharge, you must include in your SWP3 the additional requirements specified in that part. The 303(d) list of Impaired Waters in Oklahoma can be found in Appendix C of the Integrated Report on the DEQ's webpage at [http://www.deq.state.ok.us/WQDnew/305b\\_303d/index.html](http://www.deq.state.ok.us/WQDnew/305b_303d/index.html), or the DEQ GIS Map and Data Viewer at <http://deq.maps.arcgis.com/home/index.html>
- F. If a TMDL or watershed plan or local compliance plan has been approved for the waterbody, you must also describe how your SWP3 is consistent with any TMDL or watershed plan or local compliance plan applicable to your discharge. Permittees must incorporate any limitations, conditions, or requirements applicable to their discharges into the SWP3 to ensure that the waste load allocations ("WLAs") or load

<sup>16</sup> Statutes and Rules of Oklahoma State Board of Licensure for Professional Engineers & Land Surveyors, Section 472.2 "Definitions" states "practice of engineering means any service or creative work, the adequate performance of which requires engineering education, training and experience in the application of special knowledge of the mathematical, physical and engineering sciences to such services or creative work as consultation, investigation, evaluation, planning and design of engineering works and systems, planning the engineering use of land and water, teaching of advanced engineering subjects or courses related thereto, engineering research, engineering surveys, engineering studies, and the inspection or review of construction for the purposes of assuring compliance with drawings and specifications; any of which embraces such services or work, either public or private, in connection with any utilities, structures, buildings, machines, equipment, processes, work systems, projects, and industrial or consumer products or equipment of a mechanical, electrical, chemical, environmental, hydraulic, pneumatic or thermal nature, insofar as they involve safeguarding life, health or property, and including such other professional services as may be necessary to the design review and integration of a multidiscipline work, planning, progress and completion of any engineering services."

allocations (“Las”) and/or the TMDL’s associated implementation plan will be met within any timeframe established in the TMDL report or watershed plan. Monitoring and reporting of the discharges may also be required as appropriate to ensure compliance with the TMDL or watershed plan.

- G. If the industrial activities associated with a concrete or asphalt batch plant are directly related to your construction site and are covered under this permit, those activities are considered part of your construction site and must be considered when developing your SWP3. You must also include the additional requirements outlined in Appendix C.

## 5.2 Signature, Posting a Notice, Making Plans Available, and DEQ’s Notification

- A. The SWP3 shall be signed and be retained on-site or at an easily accessible location in accordance with Part 6, and shall include a copy of this permit. An easily accessible location can include electronic availability, provided that the SWP3 is still readily available in a form and location that can be accessed by a reasonable person.).
- B. The permittee shall post a notice near the main entrance of the construction site with the following information:
  - 1. The OPDES permit number for the project or a copy of the NOI if a permit number has not yet been assigned;
  - 2. The name and telephone number of a local contact person;
  - 3. A brief description of the project; and
  - 4. The location of the SWP3 if the site is inactive or does not have an on-site location to store the plan. If posting this information near a main entrance is infeasible due to safety concerns, the notice shall be posted in a local public building. If the construction project is a linear construction project (e.g., pipeline, highway, etc.), the notice must be placed in a publicly accessible location near where construction is actively underway and moved as necessary. This permit does not provide the public with any right to trespass on a construction site for any reason, including inspection of a site; nor does this permit require that permittees allow members of the public access to a construction site.
- C. The permittee shall make SWP3s available upon request to: DEQ and/or any state, federal, or local agency approving sediment and erosion plans, grading plans or stormwater management plans; the U.S. Fish and Wildlife Service or the Oklahoma Department of Wildlife Conservation; local government officials; or the operator of a municipal separate storm sewer system receiving discharges from the site. The copy of the SWP3 that is required to be kept on-site or at an easily accessible location must be made available to DEQ for review at the time of an on-site inspection. An easily accessible location can include electronic availability, provided that the SWP3 is still readily available in a form and location that can be accessed by a reasonable person. Also, in the interest of public involvement, DEQ encourages permittees to make their SWP3s available to the public for viewing during normal business hours.
- D. DEQ may notify the permittee at any time that the SWP3 does not meet one or more of the minimum requirements of this Part. Such notification shall identify those provisions of this permit that are not being met by the SWP3, as well as those requiring modification to meet the minimum requirements of this Part. Within seven calendar days of receipt of such notification from DEQ (or as otherwise provided by DEQ), the permittee shall make the required changes to the SWP3 and shall submit to DEQ a written certification that the requested changes have been made. DEQ may take appropriate enforcement action for the period of time the permittee was operating under a plan that did not meet the minimum requirements of this permit.

## 5.3 Contents of the SWP3

The SWP3 must include the following information, at a minimum:

- A. Stormwater Team  
Identify the personnel (by name or position) who are part of the stormwater team, as well as their individual responsibilities, including which members are responsible for implementation of the SWP3 and compliance with permit requirements, including Appendix C. Each member of the stormwater team must have ready access to an electronic or paper copy of applicable portions of this permit, the most updated copy of your SWP3, and other relevant documents or information that must be kept with the SWP3.

B. Nature of Activities

Describe the nature of the construction activity, including the size of the property in acres (or length in miles if it is a linear construction site), latitude and longitude at the center of construction site (latitude and longitude at the starting and ending points if it is a linear construction site), the total area expected to be disturbed by the construction activities (in acres), on-site and off-site construction support activities covered by this permit, post-construction runoff coefficient, pre-construction and post-construction total impervious area (in acres), the maximum area expected to be disturbed at any one time and types of soil and fill materials. If your site will utilize construction support activities (e.g., concrete or asphalt batch plants), describe the nature of the industrial activities at your site. The SWP3 must also indicate business days and hours of operation.

C. Other Site Operators

Include a list of all other operators who will be engaged in construction activities at your site, and the areas of the site over which each operator has control. The list should specify whether these operators have obtained a separate authorization or will be operating under your authorization.

D. Contractor Certifications

This procedure is initiated only at the discretion of the permittee/primary operator with the cooperation and agreement of the contractor. The contractor certification form should be rewritten by the permittee to fit their specific objectives. Contractor certification is recommended but is not a requirement of this permit.

1. Contractors, subcontractors, builders, installers, regular suppliers, support service companies or others who are not the permittee/primary operator (hereinafter referred as "contractor") but are involved in construction activity, and have not been issued an OKR10 authorization, should execute a contractor certification, at the discretion of the permittee, which places the responsibility of implementing and complying with the permittee's/primary operator's SWP3, including BMPs and other controls, with the contractor for work performed under the authority and direction of the contractor. Contractors must ensure that activities performed under the SWP3 are protective of high priority sites according to Part 4.6.
2. Contractors must ensure that any additional SWP3 terms and conditions implementing approved TMDL reports, watershed plans or local TMDL compliance plans are applied to the sites (also see Part 5.1.F).
3. Contractors must be thoroughly familiar with and adhere to the NOI, SWP3, BMPs, and other control measures. The SWP3 must clearly identify, for each control measure identified in the plan, the party which will implement the measure. The permittee/primary operator must ensure that all contractors or others involved in construction activity are identified in the plan as being responsible for implementing stormwater control measures, and sign a copy of the contractor certification, before performing any work in the area covered by the SWP3. All contractor certifications must be included with the SWP3.
4. The contractor certification must include the name and title of the person providing the signature, the name, address, and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

E. Sequence and Estimated Schedule of Construction Activities

The SWP3 must include a description of the intended sequence of major construction activities, including a schedule of the estimated start dates and the duration of the activity, for the following:

1. Installation of stormwater control measures, and when they will be made operational, including an explanation of how the sequence and schedule for installation of stormwater control measures complies with Part 4 and of any departures from manufacturer specifications.
2. Commencement and duration of earth-disturbing activities in each portion of the site, including clearing and grubbing, mass grading, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization.
3. Temporary or permanent cessation of construction activities in each portion of the site.
4. Temporary or final stabilization of disturbed areas for each portion of the site.
5. Removal of temporary stormwater control measures and construction equipment or vehicles, and the cessation of construction-related pollutant-generating activities.

6. Installation, operation, and closure of construction support activities (e.g., concrete or asphalt batch plants).
- F. Site Map
- Include a legible map, or series of maps, showing the following features of your site:
1. Boundaries of the property.
  2. Locations where construction activities will occur, including
    - a. locations where earth-disturbing activities will occur, noting any phasing of construction activities;
    - b. approximate slopes, noting areas of steep slopes (i.e., greater than 40 percent), before and after major grading activities;
    - c. locations where sediment, soil, or other construction materials will be stockpiled;
    - d. locations of crossings of any waters of the state;
    - e. designated points where vehicles will exit onto paved roads;
    - f. locations of structures and other impervious surfaces upon completion of construction;
    - g. locations of on-site or off-site construction support activity covered by this permit; and
    - h. locations where polymers, flocculants, or other treatment chemicals will be used and stored.
  3. Locations of all waters of the state within one mile of the site, including wetlands that exist within or in the immediate vicinity of the site. Indicate which waterbodies are listed as impaired, which lie within a watershed with an approved TMDL, and which are identified by the state as ARC or ORW.
  4. Type and extent of pre-construction cover on the site (e.g., vegetative cover, forest, pasture, pavement, and structures).
  5. Drainage pattern(s) of stormwater run-on or runoff and authorized non-stormwater before and after major grading activities.
  6. Stormwater and allowable non-stormwater discharge point locations, including
    - a. locations where stormwater and/or allowable non-stormwater will be discharged to storm drain inlets on the site and in the immediate vicinity of the site; and
    - b. locations where stormwater or allowable non-stormwater will be discharged directly to waters of the state on or near the site.
  7. Locations of all potential pollutant-generating activities identified in Part 5.3.G.
  8. Locations of stormwater control measures, including natural buffer areas required by Parts 4.2.B and/or 4.6.
  9. If your site will utilize construction support activities (e.g., concrete or asphalt batch plants, etc.), you must also specify the boundaries of these activities, significant structures and impervious area, and the location of visual monitoring location(s). Indicate which visual monitoring locations are considered "substantially identical," if any. If applicable, specify the location of numeric effluent limitations monitoring ("NELM") sampling location(s).
- G. Summary of Potential Pollutant Sources
- Identify and list all pollutants and all pollutant-generating activities associated with those pollutants. You must take into account where potential spills and leaks could occur that would contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, which will be disturbed or removed during construction. If your site will utilize construction support activities (e.g., concrete or asphalt batch plants), you must also document the area at your facility where industrial materials or activities are exposed to stormwater. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product.
- H. A Copy of Permit Requirements
- Include a copy of this permit (an electronic copy easily available to the stormwater team is also acceptable) and signed NOI in your SWP3.
- I. Measures to Protect High Priority Sites
- If you discharge to a high priority site, you must describe and implement any measures necessary to meet the requirements of Part 4.6. You must also include the following documentation as applicable:

1. Information on whether listed endangered or threatened species or critical habitat are found in proximity to the construction activity, and whether such species may be affected by the stormwater discharges or stormwater discharge-related activities (see Appendix A and Part 2.5). You must describe and implement the measures specified in Part 4.6 to protect these endangered species and threatened habitat and resource waters in the SWP3, including any equivalent sediment controls specified in Appendix D.
  2. Information on whether stormwater is discharged to waters identified as ORW (see Appendix B).
  3. Information on whether stormwater is discharged within one stream mile of a waterbody listed on the latest approved Clean Water Act 303(d) list as impaired. Include information on whether stormwater discharges or stormwater discharge-related activities would have an effect on water quality of the receiving waters. Describe how the BMPs and other controls selected for the site will reduce and avoid the discharges of the pollutant(s) of concern, including requirements of 2.3.F.
  4. Information on whether stormwater is discharged into a waterbody with an approved TMDL or watershed plan. You must describe and implement any measures necessary to meet the requirements of the approved TMDL or watershed plan and/or associated implementation schedule established in the TMDL or watershed plan. Monitoring and reporting of discharge quality may also be required if necessary to ensure compliance with an approved TMDL or watershed plan.
- J. Federal, State or Local Historic Properties  
Include documentation required in Part 2.4.
- K. Stormwater Control Description  
Include a description of all control measures required in Part 4. The description and implementation of control measures must include the following:
1. Erosion and Sediment Controls
    - a. Utilize EPA's national BMP menu and/or other references to select appropriate control measures and provide the descriptions of the selected control measures for your site. The selected control measures must meet the following requirements, as well as being in compliance with state and local regulations for your site, including:
      - i. The construction-phase erosion and sediment controls should be designed to retain sediment on site to the extent practicable;
      - ii. All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee must replace or modify the control for site situations;
      - iii. If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impact (e.g., fugitive sediment in streets could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets);
      - iv. Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%;
      - v. Litter, construction debris, and construction chemicals (e.g., fuel, hydraulic fluids, etc.) exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., by screening outfalls or picking up daily);
      - vi. Off-site construction storage areas (also including overburden and stockpiles of dirt, borrow areas, etc.) used solely by the permitted project are considered a part of the project and shall be addressed in the SWP3; and
      - vii. Many applications of straw and hay bales for erosion and sediment control have proven ineffective, maintenance-intensive and expensive. Therefore, straw or hay bales as BMP controls within the state are not allowed. Alternatives to straw or hay bales can be silt fence, rock check dams, fiber rolls, geotextiles, compost blankets, filter fabric, gravel bags and other designs.
    - b. Include natural buffers and/or equivalent sediment controls required in Parts 4.2.B or 4.6.
    - c. Describe the specific vegetative and/or non-vegetative stabilization practices that will be used to achieve temporary and final stabilization on the exposed portions of your site as required in Part

- 4.3. Record any unforeseen circumstances that cause delays in initiation and/or completion of vegetative stabilization, with the schedule for initiating and completing stabilization.
- d. Include a description of structural controls to divert flows from exposed soils, retain flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Structural controls may include but are not limited to: silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet structure protection, rock outlet structure protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins (also see Part 4.4.A). Placement of structural controls in floodplains should be avoided to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA.
  - e. Include sediment basin(s) required in Part 4.2.L. Include supporting documentation such as drainage pattern(s), storage calculation(s), and building specification(s).
2. Pollution Prevention
- a. Describe procedures that you will follow to prevent and respond to spills and leaks (also see Part 4.4.B.1), including:
    - i. Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or position of the employee(s) responsible for the detection and response to spills or leaks; and
    - ii. Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 4.4.B.2 and established under either 40 C.F.R. Parts 110, 117, or 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available.
    - iii. You may also reference the existence of Spill Prevention Control and Countermeasure (SPCC) plans developed for the construction activity under Part 311 of the CWA, or spill control programs otherwise required by an OPDES permit for the construction activity, provided that you keep a copy of that other plan on site.
    - iv. Describe waste management procedures for how you will handle and dispose of all wastes generated at your site, including, but not limited to, clearing and demolition debris, sediment removed from the site, construction and domestic waste, hazardous or toxic waste, and sanitary waste.
    - v. For application of fertilizers, document any departures from the manufacturer specifications where appropriate (see Parts 4.4.B.5 and 4.4.D).
    - vi. Identify and document where potential spills and leaks could occur that would contribute pollutants to stormwater discharges and corresponding outfall(s) that can be affected by such spills and leaks. You must also describe the procedures that will be followed for cleaning up spills or leaks.
  - b. Monitoring (if applicable)
 

If the discharges from the facilities are subject to the visual monitoring and/or numeric limitations in Part 4.5 and Appendix C, the SWP3 must document the procedures you will follow for taking samples or observations consistent with Appendix C, including:

    - i. Person(s) or position(s) of person(s) responsible for conducting stormwater monitoring.
    - ii. Locations where samples will be collected.
    - iii. Documentation regarding substantially identical outfalls as specified in Appendix C.3.A.4, if applicable.
    - iv. Parameters for sampling and the frequency of sampling for each parameter, if applicable.
    - v. Procedures for sample collection, handling and analysis, including equipment to be used.
    - vi. Procedures for sending samples to a certified laboratory (including identifying the laboratory or laboratories to be used).
    - vii. Schedules for monitoring at the site.
    - viii. Any numeric control values, e.g., effluent limitations guidelines, TMDL or watershed plan-related requirements, or other requirements, applicable to discharges from each outfall.

- ix. The normal working hours associated with the project.
- x. Procedures for notifying and activating your sampling team when a discharge is occurring or is expected to occur, and to ensure that samples are taken.
- c. Approved Local Plans
 

Permittees which discharge stormwater associated with construction activities must ensure their SWP3 is consistent with requirements specified in applicable sediment and erosion site plans of site permits, or stormwater management site plans, or site permits approved by local officials. The SWP3 must be updated as necessary to remain consistent with any changes applicable to protecting surface water resources in sediment erosion site plans or site permits, or stormwater management site plans or site permits approved by local officials from whom the permittee receives written notice.
- L. Maintenance
 

All erosion and sediment control measures and other protective measures, including site routine maintenance specifications, identified in the SWP3 must be maintained in effective operating condition. If site inspections required by Part 4.1 identify BMPs that are not operating effectively, maintenance shall be performed before the next anticipated storm event, or as necessary to maintain the continued effectiveness of stormwater controls. If existing BMPs need to be modified or if additional BMPs are necessary for any reason, implementation must be completed before the next storm event whenever practicable. If maintenance prior to the next anticipated storm event is impracticable, the situation must be documented in the SWP3 and maintenance must be scheduled and accomplished as soon as possible. Any maintenance checklists or other forms that will be used must be included in the SWP3.
- M. Inspections
 

Include all information specified in Part 5.4.
- N. Correction Actions
 

Include all information specified in Part 5.5.
- O. Non-Stormwater Discharges
 

Identify all allowable non-stormwater discharges in Part 2.2 that will or may occur. You must document in your SWP3 all non-stormwater discharges from the site.
- P. Staff Training Requirements
 

You must describe a stormwater employee training program and identify periodic dates (e.g., every six months<sup>17</sup>) for such training.

  - 1. Prior to the commencement of earth-disturbing activities or pollutant-generating activities, whichever occurs first, the permittee must ensure that the following personnel understand the requirements of this permit and their specific responsibilities with respect to those requirements:
    - a. Personnel who are responsible for the design, installation, maintenance, and/or repair of stormwater controls, including pollution prevention measures.
    - b. Personnel responsible for the application and storage of chemicals (if applicable).
    - c. Personnel responsible for inspections as required in Part 5.4. Such personnel must be a "qualified person" as defined in Part 1.FF.
    - d. Personnel who are responsible for taking corrective actions as required in Part 5.5.
    - e. Personnel who are responsible for operating and/or maintaining construction support activities (e.g., concrete or asphalt batch plants), if applicable.
  - 2. At a minimum, personnel must be trained to understand the following if related to the scope of their job duties (e.g., only personnel responsible for conducting inspections need to understand how to conduct inspections):
    - a. The location of all stormwater controls on the site required by this permit, and how they are to be maintained;
    - b. The proper procedures to follow with respect to the permit's pollution prevention requirements; and
    - c. When and how to conduct inspections, record applicable findings, and take corrective actions.

<sup>17</sup> For construction support activities (e.g. concrete or asphalt batch plants), employee training shall be conducted at least once per year (and more often if employee turnover is high).

Q. NCOs for Individual Lots in Residential Subdivisions

The permittee shall not terminate their permit coverage until they have notified the new owners/operators of the individual lots within the larger common plan of development of their permitting requirements. The permittee must complete and sign an NCO which shall be signed by both the permittee and new owner, submit it to DEQ, and include copies of all NCOs in the SWP3 (see Part 3.6.A.2). The original or transferring owner(s)/operator(s) must also notify the new owner(s)/operator(s) of their responsibility to obtain their own permit coverage with DEQ prior to commencement of construction activities.

R. SWP3 Certification

The SWP3 must be certified, signed and dated in accordance with Part 7.6.

S. SWP3 Modification

1. Modify the SWP3, including the site map(s), within seven calendar days of any of the following conditions:

- a. Whenever new operators become active in construction activities on the site, or the construction plans, stormwater controls, or other activities have been changed at the site that are no longer accurately reflected in the SWP3, including the changes in Part 5.3.N;
- b. To reflect areas on the site map where operational control has been transferred since initiating permit coverage;
- c. If inspections or investigations determine that SWP3 modifications are necessary for compliance with this permit;
- d. Where an inspector or investigator determines it is necessary to install and/or implement additional controls at the site to meet the requirements of this permit (e.g., an approved TMDL report applies to the site); or
- e. To reflect any revision to applicable federal, state and local requirements that affect the stormwater controls implemented at the site.

2. Maintain records showing the dates of all SWP3 modifications, including the name and title of the person authorizing each change; and

3. Upon determining that a modification to the SWP3 is required, if there are multiple operators (or subcontractors) covered under this permit, the permittee must immediately notify any operators who may be impacted by the change to the SWP3.

T. On-Site Availability of SWP3

A current copy of the SWP3 must be kept on-site or at an easily accessible location so that it can be made available at the time of an on-site inspection or upon request by DEQ. An easily accessible location can include electronic availability, provided that the SWP3 is still readily available in a form and location that can be accessed by a reasonable person.

#### 5.4 Inspection Requirements

A. Person(s) Responsible for Inspecting Site

The person(s) inspecting your site may be a person on your staff or a third party you hire to conduct such inspections. If you hire a third party to conduct inspections, and that party cannot implement corrective actions without prior approval, at least one member of your stormwater team must be present during inspections<sup>18</sup>. You are responsible for ensuring that the person who conducts inspections is a “qualified person” as defined in Part 1.FF. An inspection form shall be developed and included in your SWP3.

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<sup>18</sup> If a member of the stormwater team cannot be present during the inspection, the report must be signed by a member of the stormwater team within 24 hours of receiving the completed report.

**Table 5-1 Minimum Inspection Frequencies**

Minimum Inspection Frequency	Type of Construction Site	
	Standard	High Priority
Routine Inspection Frequency	<p>You must conduct a site inspection when discharge is occurring</p> <ul style="list-style-type: none"> <li>once every 14 calendar days, and</li> <li>within 24 hours of the end of a storm event of 0.5 inches or greater, and</li> <li>within 24 hours of a discharge generated by snowmelt.</li> </ul>	<p>You must conduct a site inspection when discharge is occurring</p> <ul style="list-style-type: none"> <li>once every seven calendar days, and</li> <li>within 24 hours of the end of a storm event of 0.5 inches or greater, and</li> <li>within 24 hours of a discharge generated by snowmelt.</li> </ul>
Reduced Inspection Frequency	You must conduct a site inspection once per month.	

**B. Frequency of Inspections**

At a minimum, you must conduct a site inspection once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater and within 24 hours of a discharge generated by snowmelt, unless you are discharging from a high priority site subject to Part 4.6.B.4. If a storm event of 0.5 inches or greater, or snowmelt, causes your site to discharge, within 24 hours of the end of the storm event or the beginning of the snowmelt discharge you must conduct a site inspection when the discharge is occurring.<sup>19</sup> Minimum inspection frequencies are outlined in Table 5-1.

**C. Reductions in Inspection Frequency**

You may reduce the frequency of inspections to once per month in areas of your site where you have initiated vegetative stabilization that meets the criteria in Part 4.3, once you have completed the initial seeding or planting, and provided protection with non-vegetative cover pursuant to Part 4.3, or you have installed temporary, non-vegetative stabilization that meet the criteria in Part 4.3. If construction activity resumes at a later date, the inspection frequency shall immediately increase to that required in Part 5.4.B. Reduced inspection frequencies are outlined in Table 5-1.

**D. Areas That Need to be Inspected**

During your site inspection, you must at a minimum inspect the following areas of your site:

1. All areas that have been cleared, graded, or excavated and that have not yet completed stabilization consistent with Part 4.3;
2. All stormwater controls or management devices (including pollution prevention measures) installed at the site to comply with this permit;
3. Material, waste, borrow, or equipment storage and maintenance areas that are covered by this permit;
4. All areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater;
5. All points of discharge from the site, including exit points where sediment could be tracked out from the site; and
6. All locations where stabilization measures have been implemented.
7. All areas where construction support activities (e.g., concrete or asphalt batch plants) will be taking place, if applicable.

**E. Requirements for Inspections**

During your site inspection, you must at a minimum:

<sup>19</sup> Inspections are only required during the site's normal working hours. For the purposes of the inspection requirements in this Part, conducting an inspection "within 24 hours" means that once the conditions in Part 5.4.B are met, you have 24 hours from that time to conduct an inspection. For clarification, the 24 hours is counted as a continuous passage of time, and not counted by business hours (e.g., three business days of eight hours each). When the 24-hour inspection time frame occurs entirely outside of normal working hours, you must conduct an inspection by no later than the end of the next business day.

1. Check whether all erosion, sediment, and pollution prevention controls are properly installed, appear to be operational, and are working as intended to minimize pollutant discharges. Determine if any controls need to be replaced, repaired, or maintained in accordance with Part 5.3.L;
  2. Check for the presence of conditions that could lead to spills, leaks, or other accumulations of pollutants on the site;
  3. Identify any locations where new or modified stormwater controls are necessary to meet the requirements of Parts 4.2, 4.3, and/or 4.4 (if applicable);
  4. Check the points of discharge and, if applicable, the banks of any surface waters flowing within your property boundaries or immediately adjacent to your property, for signs of visible erosion and sedimentation (i.e., sediment deposits) that have occurred and are attributable to your discharge. If not accessible, nearby downstream locations must be inspected to the extent practicable;
  5. Identify any incidents of noncompliance observed;
  6. If a discharge is occurring during your inspection, you are required to:
    - a. Identify all points of the property from which there is a discharge.
    - b. Observe and document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including color, odor, floating, settled, or suspended solids, foam, oil sheen, and other obvious indicators of stormwater pollutants.
    - c. Document whether your stormwater controls are operating effectively and describe any such controls that are clearly not operating as intended or are in need of maintenance.
  7. Based on the results of your inspection and necessary maintenance initiate corrective action under Part 5.5.
- F. Inspection Report
1. You must complete an inspection report within 24 hours of completing any site inspection. Each inspection report must include the
    - a. inspection date;
    - b. names and titles of personnel making the inspection;
    - c. summary of your inspection findings, covering at a minimum the observations you made in accordance with Part 5.4.D;
    - d. the applicable rain gauge or weather station readings that triggered the inspection if you conducted an inspection because of rainfall measuring 0.5 inches or greater; and
    - e. the description or reason you found any portion of your site, including the specific location, to be unsafe if you are unable to complete a site inspection due to safety concerns.
  2. Each inspection report must be signed in accordance with Part 7.7.
- G. Record Keeping Requirements
- You are required to keep copies of all inspection reports on-site or at an easily accessible location, so that they can be made available at the time of an on-site inspection or upon request by DEQ. An easily accessible location can include electronic availability, provided that the SWP3 is still readily available in a form and location that can be accessed by a reasonable person.

## 5.5 Corrective Action Requirements

### A. Requirements for Taking Corrective Action

You must complete the following corrective actions (see definition in Part 1.J). In all circumstances, you must immediately take all reasonable steps to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational, including cleaning up any contaminated surfaces so that the material will not discharge in subsequent storm events. Failure to implement the required corrective action constitutes a permit violation under Part 7.1.

1. For any of the following conditions on your site, you must review and revise the selection, design, installation, and implementation of your control measure(s) to ensure that the condition is eliminated and will not be repeated in the future. You must install a new or modified control and make it operational, or complete the repair, by no later than seven calendar days from the time of discovery. If it is infeasible to complete the installation or repair within seven calendar days, you must document in your records why it is infeasible to complete the installation or repair within the seven calendar-day timeframe and document your schedule for installing the stormwater controls and making it operational as soon as practicable after the seven calendar-day timeframe. Where your corrective

actions result in changes to any of the stormwater controls or procedures documented in your SWP3, you must modify your SWP3 accordingly within seven calendar days of completing corrective action work.

- a. A required stormwater control was never installed, was installed incorrectly or not in accordance with the requirements in Parts 4 and/or 5.
- b. A stormwater control needs to be repaired or replaced (beyond routine maintenance required in Part 5.3.L).
- c. You become aware, or DEQ determines, that the controls you have installed and are maintaining are not effective enough for the discharge to meet applicable water quality standards or applicable requirements in Part 4.
- d. An unauthorized release or discharge (e.g., spill, leak, or discharge of non-stormwater not authorized by this or another OPDES permit) has occurred.
- e. If you are subject to the monitoring requirements in Part 4.5 and Appendix C, samples indicate that you have a discharge that exceeds the applicable effluent limitation.

B. Corrective Action Report

1. Within 24 hours of discovering the occurrence of one of the triggering conditions in Part 5.5.A.1 at your site, you must provide a record of the following:
  - a. Which triggering condition was identified at your site.
  - b. The nature of the condition identified.
  - c. The date and time of the condition identified and how it was identified.
2. Within seven calendar days of discovering the occurrence of one of the triggering conditions in Part 5.5.A.1 at your site, you must complete a record of the following:
  - a. Any follow-up actions taken to review the design, installation, and maintenance of stormwater controls, including the dates such actions occurred.
  - b. A summary of stormwater control modifications taken or to be taken, including a schedule of activities necessary to implement changes, and the date the modifications are completed or expected to be completed.
  - c. Notice of whether SWP3 modifications are required as a result of the condition identified or corrective action.
3. Each corrective action report must be signed in accordance with Part 7.6.

C. Recordkeeping Requirements

You are required to keep current copies of all corrective action reports on-site or at an easily accessible location, so that they can be made available at the time of an on-site inspection or upon request by DEQ. An easily accessible location can include electronic availability, provided that the SWP3 is still readily available in a form and location that can be accessed by a reasonable person.

**PART 6 RETENTION OF RECORDS****6.1 Documents**

The permittee shall retain copies of the SWP3 and all reports required by this permit, and records of all data used to complete the NOI to be covered by this permit, for a period of at least three years from the date that the site is finally stabilized. This period may be extended by request of DEQ at any time.

**6.2 Accessibility**

The permittee shall retain a copy of the SWP3 required by this permit (including a copy of the permit language) at the construction site (or other local location accessible to DEQ; a state or local agency approving sediment and erosion plans, grading plans, or stormwater management plans; local government officials; or the operator of a municipal separate storm sewer receiving discharges from the site) from the date of project initiation to the date of final stabilization. Permittees with day-to-day operational control over SWP3 implementation shall have a copy of the latest SWP3 available at a central location on-site for the use of all operators and those identified as having responsibilities under the SWP3 whenever they are on the construction site.

**6.3 Addresses**

All written correspondence concerning this permit, including the submittal of NOIs and NOTs, shall be sent to DEQ at the address, fax or email in Part 3.8.

All documents shall be submitted in accordance with all state and federal reporting requirements.

**Part 7 Standard Permit Conditions****7.1 Duty to Comply**

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the C.W.A. within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement. Penalties for violations of permit conditions are provided below:

**A. Criminal Penalties****1. Negligent Violations.**

The OPDES Act provides that any person who negligently violates permit conditions is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or both (27A O.S. § 2-6-206 (G) (1)).

**2. Knowing Violations.**

The OPDES Act provides that any person who knowingly violates permit conditions is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than three years, or both (27A O.S. § 2-6-206 (G) (2)).

**3. Knowing Endangerment.**

The OPDES Act provides that any person who knowingly violates permit conditions, and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury, is subject to a fine of not more than \$250,000, or by imprisonment for not more than 15 years, or both (27A O.S. § 2-6-206 (G)(3)).

**4. False Statement.**

The OPDES Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the OPDES, or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the OPDES, shall upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four years, or by both (27A O.S. § 2-6-206 (G)(4)).

**B. Civil Penalties.**

The OPDES Act provides that any person who violates a permit condition is subject to a civil penalty not to exceed \$10,000 per day for each violation (27A O.S. § 2-6-206 (F)).

**C. Administrative Penalties.**

The OPDES Act provides that any person who violates a permit condition is subject to an administrative penalty, not to exceed \$10,000 per day of violation nor shall the maximum amount exceed \$125,000 per violation [see 27A O.S. § 2-6-206 (E)].

**7.2 Continuation of the Expired General Permit**

If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued and remain in full force and effect. Any permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:

- A. Reissuance or replacement of this permit, at which time the permittee must comply with the NOI conditions of the new permit to maintain the authorization to discharge; or
- B. The permittee's submittal of an NOI; or
- C. Issuance of an individual permit for the permittee's discharges; or
- D. A formal permit decision by DEQ not to reissue this general permit, at which time the permittee must seek coverage under an alternative general permit or an individual permit.

Any new applicant who applies for coverage after the expiration date of this general permit will not be granted permit coverage until this general permit is reissued.

**7.3 Need to Halt or Reduce Activity Not a Defense**

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

**7.4 Duty to Mitigate**

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

**7.5 Duty to Provide Information**

The permittee shall furnish to DEQ, or an authorized representative of DEQ, within a reasonable time, any information which DEQ may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to DEQ upon request, copies of records required to be kept by this permit.

**7.6 Signatory Requirements**

All NOIs, NOTs, reports, certifications (except the contractor certification under Part 5.3.D) or information either submitted to DEQ or the operator of an MS4, or that this permit requires be maintained by the permittee, shall be signed as follows:

A. All NOIs and NOTs shall be signed as follows.

1. For a corporation - by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means:
  - (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or
  - (b) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
2. For a Limited Liability Company (LLC) - by a member, managing or otherwise; or
3. For a partnership - by a general partner; or
4. For a sole proprietorship - by the proprietor (owner); or
5. For a municipality, state, federal, or other public agency - by either a principal executive officer or ranking elected official. For purposes of this Section, a principal executive officer of a federal agency includes:
  - (a) The chief executive officer of the agency; or
  - (b) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of the EPA).

B. All reports required by this permit and other information requested by DEQ or authorized representative of DEQ shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to DEQ;
2. The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator, superintendent, or position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
3. The signed and dated written authorization must be included in the SWP3.

C. Changes to Authorization.

If an authorization under Part 3.1 is no longer accurate because a different operator has responsibility for the overall operation of the construction site, a new NOI satisfying the requirements of Part 3.1 must be submitted to DEQ prior to or together with any reports, information, or applications to be signed by an authorized representative. The change in authorization must be submitted within the time frame specified in Part 3.5 and sent to the address specified in Part 3.8.

D. Any person signing documents under this Part shall make the following certification:

*"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

**7.7 Oil and Hazardous Substance Liability**

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the CWA or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") of 1980, 42 U.S.C. § 9601 *et seq.*

**7.8 Property Rights**

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.

**7.9 Severability**

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

**7.10 Requiring an Individual Permit or an Alternative General Permit**

- A. DEQ may require any person authorized by this permit to apply for and/or obtain either an individual OPDES permit or an alternative OPDES general permit. Any interested person may petition DEQ to take action under this paragraph. Where DEQ requires a permittee authorized to discharge under this permit to apply for an individual OPDES permit, DEQ shall notify the permittee in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the permittee to file the application, and a statement that on the effective date of issuance or denial of the individual OPDES permit or the alternative general permit as it applies to the individual permittee, coverage under this general permit shall automatically terminate. Applications shall be submitted to the address in Part 3.8. DEQ may grant additional time to submit the application upon request of the applicant. If a permittee fails to submit in a timely manner an individual OPDES permit application as required by DEQ under this paragraph, then the applicability of this permit to the individual OPDES permittee is automatically terminated at the end of the day specified by DEQ for application submittal.
- B. Any permittee authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. In such cases, the permittee shall submit an individual permit application in accordance with the requirements of 40 C.F.R. § 122.26 (c) (1) (ii), with reasons supporting the request, to DEQ at the address in Part 3.8 of this permit. The request may be granted by issuance of any individual permit or an alternative general permit if the reasons cited by the permittee are adequate to support the request.

- C. When an individual OPDES permit is issued to a permittee otherwise subject to this permit, or the permittee is authorized to discharge under an alternative OPDES general permit, the applicability of this permit to the individual OPDES permittee is automatically terminated on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit, whichever the case may be. When an individual OPDES permit is denied to an operator otherwise subject to this permit or the operator is denied coverage under an alternative OPDES general permit, the applicability of this permit to the individual OPDES permittee is automatically terminated on the date of such denial, unless otherwise specified by DEQ.

#### 7.11 State/Tribal Environmental Laws

- A. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state/tribal law or regulation under authority preserved by Section 510 of the Clean Water Act.
- B. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.
- C. Construction activities on Indian Country lands are regulated by the EPA Region 6 office located in Dallas, Texas. Applicants seeking coverage for construction or surface disturbing activities located on Indian Country land should contact the EPA Region 6 office.

#### 7.12 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions and requirements of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when necessary to achieve compliance with the conditions of this permit.

#### 7.13 Inspection and Entry

The permittee shall allow DEQ or an authorized representative of DEQ, or in the case of a construction site that discharges through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

- A. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
- B. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and
- C. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).
- D. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

#### 7.14 Monitoring and Records

- A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
- B. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 C.F.R Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of DEQ at any time.
- C. Records of monitoring information shall include:
  - 1. The date, exact place, and time of sampling or measurements;
  - 2. The individual(s) who performed the sampling or measurements;

3. The date(s) analyses were performed;
  4. The individual(s) who performed the analyses;
  5. The analytical techniques or methods used; and
  6. The results of such analyses.
- D. Monitoring must be conducted according to test procedures approved under 40 C.F.R Part 136 unless another method is required under 40 C.F.R subchapters N or O.
- E. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four years, or both.

#### 7.15 Reporting Requirements

- A. Planned changes.  
The permittee shall give notice to DEQ as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in § 122.29(b); or
  2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under § 122.42(a)(1).
  3. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
- B. Anticipated noncompliance.  
The permittee shall give advance notice to DEQ of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- C. Transfers.  
This permit is not transferable.
- D. Monitoring reports.  
Monitoring results shall be reported at the intervals specified elsewhere in this permit.
1. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by DEQ for reporting results of monitoring of sludge use or disposal practices. As of December 21, 2016, all reports and forms submitted in compliance with this section must be submitted electronically by the permittee to DEQ or initial recipient, as defined in 40 C.F.R 127.2(b), in compliance with this section and 40 C.F.R Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, permittees may be required to report electronically if specified by a particular permit or if required to do so by state law.
  2. If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 C.F.R Part 136, or another method required for an industry-specific waste stream under 40 C.F.R subchapters N or O, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by DEQ.
  3. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by DEQ in the permit.
- E. Compliance schedules.  
Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

## F. Twenty-four hour reporting.

1. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A report shall also be provided within five days of the time the permittee becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times), and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (combined sewer overflows, sanitary sewer overflows, or bypass events), type of sewer overflow structure (e.g., manhole, combine sewer overflow outfall), discharge volumes untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the sewer overflow event, and whether the noncompliance was related to wet weather. As of December 21, 2025 or an EPA-approved alternative date (see 40 C.F.R. 127.24(e) or (f)), all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the permittee to DEQ or initial recipient, as defined in 40 C.F.R. 127.2(b), in compliance with this section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. 40 C.F.R. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of 40 C.F.R. Part 127, permittees may be required to electronically submit reports related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section by a particular permit or if required to do so by state law. DEQ may also require permittees to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section.
2. The following shall be included as information which must be reported within 24 hours under this paragraph.
  - a. Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 C.F.R. § 122.41(g).
  - b. Any upset which exceeds any effluent limitation in the permit.
  - c. Violation of a maximum daily discharge limitation for any of the pollutants listed by DEQ in the permit to be reported within 24 hours. (See 40 C.F.R. § 122.44(g).)
3. DEQ may waive the written report on a case-by-case basis for reports under paragraph 7.15.F.2 of this section if the oral report has been received within 24 hours.

## G. Other noncompliance.

The permittee shall report all instances of noncompliance not reported under paragraphs 7.15.D - F of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 7.15.F. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in paragraph 7.15.F and the applicable required data in appendix A to 40 C.F.R. Part 127. As of December 21, 2025 or an EPA-approved alternative date (see 40 C.F.R. 127.24(e) or (f)), all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the permittee to DEQ or initial recipient, as defined in 40 C.F.R. 127.2(b), in compliance with this section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. 40 C.F.R. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of 40 C.F.R. Part 127, permittees may be required to electronically submit reports related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section by a particular permit or if required to do so by state law. DEQ may also require permittees to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section.

## H. Other information.

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to DEQ, it shall promptly submit such facts or information.

- I. Identification of the initial recipient for NPDES electronic reporting data.  
The owner, operator, or the duly authorized representative of an NPDES-regulated entity is required to electronically submit the required NPDES information (as specified in appendix A to 40 C.F.R. Part 127) to the appropriate initial recipient, as determined by EPA, and as defined in 40 C.F.R. § 127.2(b). EPA will identify and publish the list of initial recipients on its web site and in the Federal Register, by state and by NPDES data group [see 40 C.F.R. § 127.2(c)]. EPA will update and maintain this listing.

#### 7.16 Bypass

- A. Definitions.
  1. **Bypass** means the intentional diversion of waste streams from any portion of a treatment facility.
  2. **Severe property damage** means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- B. Bypass not exceeding limitations.  
The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 7.16.C and D of this section.
- C. Notice.
  1. Anticipated bypass.  
If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the date of the bypass. As of December 21, 2025 or an EPA-approved alternative date (see 40 C.F.R. 127.24(e) or (f)), all notices submitted in compliance with this section must be submitted electronically by the permittee to DEQ or initial recipient, as defined in 40 C.F.R. 127.2(b), in compliance with this section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. 40 C.F.R. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of 40 C.F.R. Part 127, permittees may be required to report electronically if specified by a particular permit or if required to do so by state law.
  2. Unanticipated bypass.  
The permittee shall submit notice of an unanticipated bypass as required in paragraph 7.15.F of this section (24-hour notice). As of December 21, 2025 or an EPA-approved alternative date (see 40 C.F.R. 127.24(e) or (f)), all notices submitted in compliance with this section must be submitted electronically by the permittee to DEQ or initial recipient, as defined in 40 C.F.R. 127.2(b), in compliance with this section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. 40 C.F.R. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of 40 C.F.R. Part 127, permittees may be required to report electronically if specified by a particular permit or if required to do so by state law.
- D. Prohibition of bypass.
  1. Bypass is prohibited, and DEQ may take enforcement action against a permittee for bypass, unless:
    - a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
    - b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
    - c. The permittee submitted notices as required under paragraph 7.16.C of this section.
  2. DEQ may approve an anticipated bypass, after considering its adverse effects, if DEQ determines that it will meet the three conditions listed above in paragraph 7.16.D.1 of this section.

**7.17 Upset -****A. Definition.**

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

**B. Effect of an upset.**

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 7.17.C of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

**C. Conditions necessary for a demonstration of upset.**

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the permittee can identify the cause(s) of the upset;
2. The permitted facility was at the time being properly operated; and
3. The permittee submitted notice of the upset as required in paragraph 7.15.F.2.a of this section (24 hour notice).
4. The permittee complied with any remedial measures required under paragraph 7.4 of this section.

**D. Burden of proof.**

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

**7.18 Permit Actions**

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

**Part 8 Re-opener Clause****8.1 Potential to Cause or Contribute to a Violation**

If there is evidence indicating that the stormwater discharges authorized by this permit cause, have the reasonable potential to cause, or contribute to a violation of a water quality standard, the permittee may be required to obtain an individual permit or an alternative general permit in accordance with Part 7.10, or the permit may be modified to include different limitations and/or requirements.

**8.2 Permit Modification or Revocation**

Permit modification will be conducted according to the Oklahoma Uniform Environmental Permitting Act at Oklahoma Statutes, Title 27A, O.S., § 2-14-101 *et seq.*, OAC, 252:4-7 and 252:606, and 40 C.F.R. §§ 122.62, 122.63, 122.64, and 124.5, incorporated and adopted by reference in OAC 252:606-1-3(b).

## APPENDIX A – OKLAHOMA AQUATIC RESOURCES OF CONCERN (ARC)

## A. Sensitive waters and watersheds for federally listed species, as defined by the U.S. Fish and Wildlife Service for the OPDES OKR10 Construction General Permit (CGP) for stormwater discharges from construction activity

**Grand (Neosho) River** - A two-mile corridor (one mile from each bank) of the main stem of the Grand (Neosho) River above its confluence with Tar Creek. This corridor includes portions of Ottawa and Craig Counties.

**Cimarron River** - A two-mile corridor (one mile from each bank) of the main stem of the Cimarron River from the US Hwy-77 Bridge in Logan County upstream to and including Beaver County. This corridor includes river segments in Beaver, Harper, Kingfisher, Logan, Major, Woods, and Woodward counties.

**South Canadian River** - A two-mile corridor (one mile from each bank) of the main stem from the Eufaula Reservoir flood pool upstream to the northern border of Custer County. This corridor includes river segments in Blaine, Caddo, Canadian, Cleveland, Custer, Grady, Hughes, McClain, McIntosh, Pittsburg, Pontotoc, Pottawatomie, and Seminole counties.

**Muddy Boggy River** - A two-mile corridor (one mile from each bank) of the main stem of the Muddy Boggy River which includes portions of Choctaw, Atoka, and Coal Counties.

**Kiamichi River** - The watershed of the Kiamichi River is upstream from the Hugo Reservoir. This watershed includes portions of Choctaw, Pushmataha, Atoka, Pittsburg, Latimer, and LeFlore Counties.

**Little River** - The watershed of the Little River includes portions of Choctaw, LeFlore, Pushmataha and McCurtain Counties.

**Glover River** - The watershed of the Glover River includes portions of Pushmataha and McCurtain Counties.

**Mountain Fork River** - The watershed of the Mountain Fork River is above Broken Bow Reservoir and includes portions of LeFlore and McCurtain Counties.

**Northeast HUC-11 Watersheds** - The watersheds are identified by the following 11-digit Hydrologic Unit Codes: 11070206030, 11070206060, 11070207190, 11070208070, 11070209020, 11070209030, 11070209040, 11070209050, 11070209060\*, 11070209070, 11070209100, 11070209110 and 11070209120. These watersheds include portions of Ottawa, Craig, Delaware, and Mayes Counties.

\* This HUC does not contain a known Ozark cavefish cave. It was included because it is entirely surrounded by 11 digit HUCs with known Ozark cavefish caves; therefore, we assume that Ozark cavefishes likely occupy this portion of the watershed as well.

**Elk River** - A two-mile corridor (one mile from each bank) of the Elk River which includes portions of Delaware County.

**Spring River** - A two-mile corridor (one mile from each bank) of the Spring River which includes portions of Ottawa County.

**Verdigris River** - A two-mile corridor of the main stem from the dam of Lake Oologah to the confluence of the Arkansas River which includes river segments in Rogers, Wagoner, and Muskogee counties.

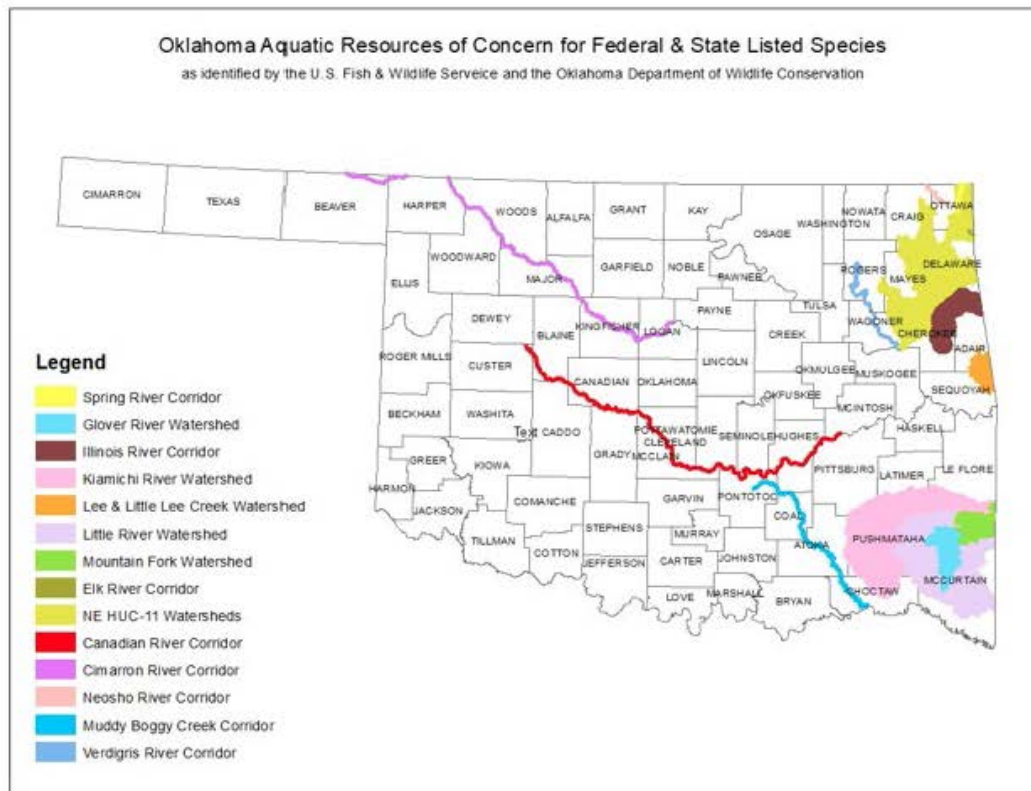
## B. Sensitive waters and watersheds for state listed species, as defined by the Oklahoma Department of Wildlife Conservation for the OPDES OKR10 Construction General Permit (CGP) for stormwater discharges from construction activity

**Illinois River** - A 10-mile corridor (five miles from each bank within the watershed) of the main stem of the Illinois River above Tenkiller Reservoir. This corridor includes portions of Cherokee, Delaware, and Mayes Counties.

**Lee and Little Lee Creeks** - The watershed of Lee Creek and Little Lee Creek which includes portions of Sequoyah and Adair Counties.

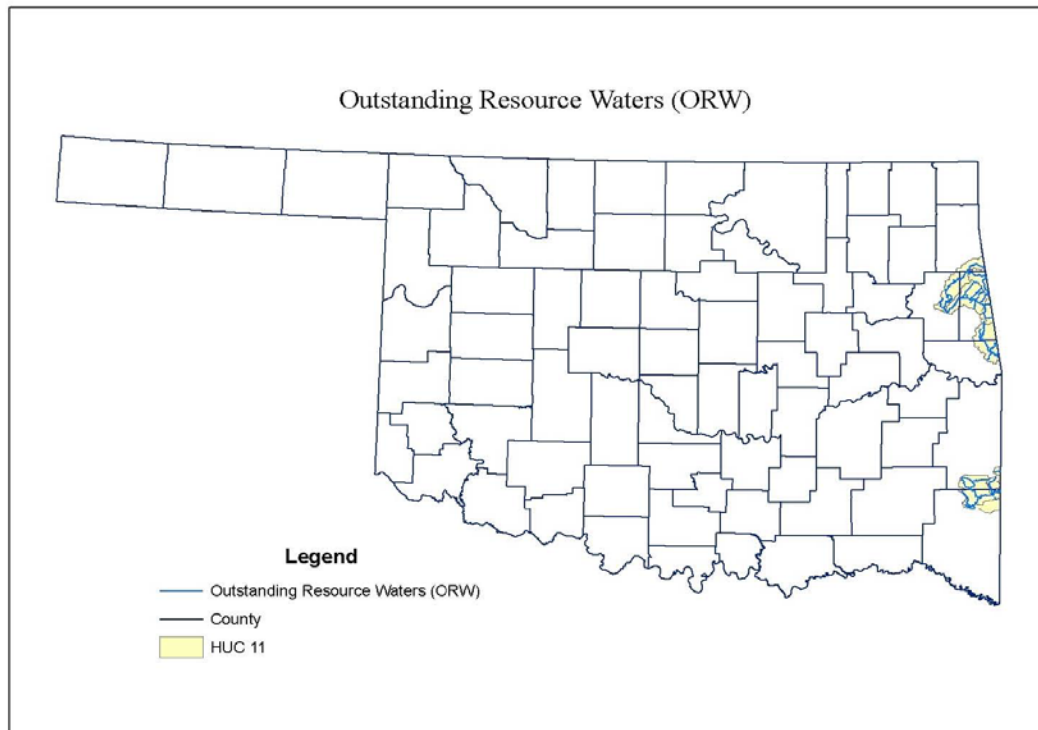
**Note:** No stormwater discharge-sensitive endangered or threatened species occur in the following counties: Alfalfa, Beckham, Carter, Cimarron, Comanche, Garfield, Garvin, Grant, Greer, Johnston, Kiowa, Lincoln, Murray, Nowata, Okfuskee, Oklahoma, Okmulgee, Rogers, Stephens, Texas, Washington, or Washita.

**Figure A-1 Oklahoma Aquatic Resources of Concern for Federal & State Listed Species**



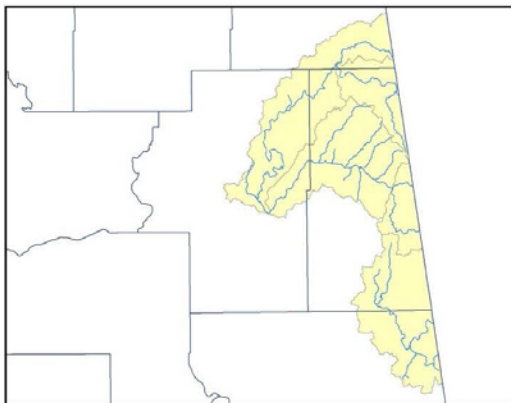
**APPENDIX B – OUTSTANDING RESOURCE WATERS (ORW)**

**Figure B- 1 Outstanding Resource Waters Statewide Map**

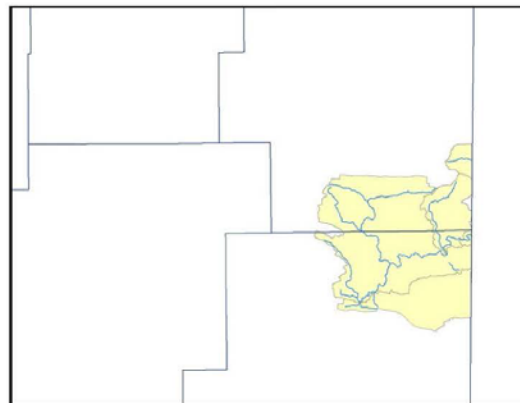


**Outstanding Resource Waters Details**

**Figure B- 2 Illinois River & Lee Creek Watersheds**



**Figure B- 3 Mountain Fork River Watershed**



**APPENDIX C – ADDITIONAL REQUIREMENTS FOR CONSTRUCTION SUPPORT ACTIVITIES****C.1. Sampling Data**

Provide a summary of any existing stormwater discharge sampling data taken at your facility. All stormwater sampling data collected during the term of this permit must also be summarized and included in this part of the SWP3. The SWP3 shall document the procedures for conducting the types of analytical monitoring specified by this permit.

**C.2 Comprehensive Site Compliance Evaluation**

The concrete or asphalt batch plant(s) covered under this permit must conduct an Annual Comprehensive Site Compliance Evaluation (“ACSCER”) using Form 606-005B and submit a copy to DEQ. At a minimum, your documentation of the ACSCER must include the scope of the inspections, the name(s) of personnel making the inspections, the date(s) of the inspections, and major observations relating to the implementation of the SWP3. Major observations should include: the location(s) of discharges of pollutants from the site; BMPs that need to be maintained; BMPs that failed to operate as designed or that proved inadequate for a particular location; additional BMPs that are needed to address any conditions requiring corrective action identified during the inspection; previously unidentified discharges from the site; previously unidentified pollutants in existing discharges; evidence of, or the potential for, pollutants entering the drainage system; evidence of pollutants discharging to receiving waters at all facility outfall(s); the condition of and around the outfall, including flow dissipation measures to prevent scouring; and any required revisions to the SWP3 resulting from the inspection.

**A. Frequency of the Comprehensive Site Compliance Evaluation**

You must conduct a comprehensive site compliance evaluation at least once a year. The inspections must be conducted by qualified personnel with at least one member of your stormwater pollution prevention team participating in the comprehensive site inspections. The qualified personnel you use may be either your own employees or outside consultants that you have hired, provided they meet the requirements specified in Part 1.FF. If you decide to conduct more frequent inspections, your SWP3 must specify the frequency of inspections.

**B. Scope of the Comprehensive Site Compliance Evaluation**

Your inspections must include all areas where construction materials or activities are exposed to stormwater, as identified in the SWP3 and areas where spills and leaks have occurred within the past three years.

**C.3 Monitoring Requirements**

All concrete and asphalt batch plants covered under this permit will be subject to quarterly visual monitoring. Numeric effluent limitation monitoring (“NELM”) is required once per year if your asphalt batch plant(s) is covered under this permit. These specific monitoring requirements and limitations are applied to the discharge at facilities with co-located activities. Where stormwater from the co-located activities is commingled, the monitoring requirements and limitations are additive.

**A. Quarterly Visual Monitoring**

The requirements and procedures for quarterly visual monitoring are applicable to all concrete and asphalt batch plants covered under this permit.

1. You must perform and document a quarterly visual monitoring of a stormwater discharge associated with industrial activity from each outfall, unless the outfall is substantially identical as outlined in Part C.3.A.4. If no storm event resulted in runoff from the facility during a monitoring quarter, you are excused from visual monitoring for that quarter provided you document in your monitoring records that no runoff occurred. You must sign and certify the documentation in accordance with Part 7.6 of the permit.
2. Your visual examination must be made during daylight hours (e.g., normal working hours). The visual examinations must be made of samples collected within the first 30 minutes of when the runoff or snowmelt begins discharging from your facility. The examination must document observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of stormwater pollution. The examination must be conducted in a well-lighted area. No analytical tests are required to be performed on the samples. All such samples must be collected from

the discharge resulting from a storm event that is greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where practicable, the same individual should carry out the collection and examination of discharges for the entire permit term.

The following table is an example of what you should look for in a visual monitoring sample.

**Table C-1 Visual Monitoring of Stormwater Discharges**

Parameter	Method	Results
Color and Extent	Visual	Clear, yellow, red, blue, green, brown, black, milky, etc.
Odor	Smell	None, earthy, sewage, musky, rotten eggs, petroleum, etc.
Clarity or Turbidity	Come up with your own test such as: clean off the label from a one-liter or similar size clear plastic or glass bottle, fill the bottle with the sample, and try to see things through it.	1) can't see through the bottle 2) can see through but could not read newsprint 3) can see through and can read newsprint 4) pretty clear, but not as clear as bottled water 5) as clear as bottled water
Floating solids	Visual	Yes/no - describe what they are.
Settled solids	Use same one-liter or similar size plastic or glass bottle	Tablespoons or cups of material or millimeters of solids on bottom after at least 60 minutes
Suspended solids	Look through the container.	Describe what do you see?
Foam	Visual	Yes - how thick is the foam? How much of the surface does it cover? What color is the foam? Or No
Oil sheen	Visual	Color and extent
Other obvious indicators of stormwater pollution	Indicate what you observed that would lead a reasonable person to believe that the stormwater was polluted.	Describe what do you see?

3. You must maintain your visual examination reports onsite with the SWP3. At a minimum, the report must include the examination date and time, locations, personnel, the nature of the discharge (i.e., runoff or snow melt), results of observations of the stormwater discharge (including observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of stormwater pollution), and probable sources of any observed stormwater contamination. If applicable, the report shall include why it was not possible to take samples within the first 30 minutes. The report must be signed in accordance with Part 7.7.
  4. If your facility has two or more outfalls that you believe discharge substantially identical effluents, based on similarities of the industrial activities and control measures, exposed materials that may significantly contribute pollutants to stormwater, and runoff coefficients of the outfalls' drainage areas, you may visually monitor the effluent of just one of the outfalls and report that the results also apply to the substantially identical outfall(s). You may monitor selected substantially identical outfall(s) on a rotating basis. For this to be permissible, you must describe each outfall authorized by this permit and the rationale for any substantially identical outfall determinations, including the locations of the outfalls, why the outfalls are expected to discharge substantially identical effluents, estimates of the size of the drainage area (in square feet) for each of the outfalls, and an estimate of the runoff coefficient of the drainage areas (low: under 40 percent; medium: 40 to 65 percent; high: above 65 percent).
- B. Numeric Effluent Limitation Monitoring ("NELM")
- If your facility has discharges of stormwater from an asphalt batch plant, you must comply with the limitations and monitoring requirements of Part 4.5 (also see Table 4-2) for all discharges containing asphalt batch plant runoff.

1. Monitoring Periods

If the project takes less than one year to complete, you shall collect at least one sample. Otherwise, you must start to collect your grab samples and analyze the samples annually within the following time periods:

The yearly monitoring periods are from January 1st to December 31st.

2. Collection and Analysis of Samples

You must assess your sampling requirements on an outfall-by-outfall basis.

- a. All required monitoring must be performed on a measurable storm event (defined as a storm that is greater than 0.1 inch in magnitude) that results in an actual discharge from your site and that follows the preceding measurable storm event by at least 72 hours. The 72-hour storm interval does not apply if you are able to document that less than a 72-hour interval is representative for local storm events during the sampling period.

- b. Take a minimum of one grab sample within the first 30 minutes of the discharge resulting from a measurable storm event. If it is not practicable to take the sample during the first 30 minutes, the sample must be collected as soon as practicable after the first 30 minutes. You must document in your SWP3 why it was not possible to take samples within 30 minutes. If the sampled discharge commingles with process or non-process wastewater, attempt to sample the stormwater discharge before it mixes with the non-stormwater.

- c. In the case of snowmelt, samples must be taken during a period with a measurable discharge.

- d. Auto-samplers or passive samplers may be used to collect grab samples. If auto-samplers or passive samplers are used, samples must still be taken in accordance with paragraphs a-c above.

3. Storm Event Data

For each monitoring event, except snowmelt monitoring, you must provide the date and duration (in hours) of the storm event(s); rainfall measurements or estimates (in inches) of the storm event; time (in days) since the previous measurable (greater than 0.1 inch rainfall) storm event; and an estimate of the total volume (in gallons) of the discharge sample. For snowmelt monitoring, you must identify the date of the sampling event.

4. Follow-up Monitoring Requirements if Discharge Exceeds Numeric Effluent Limit

You must conduct follow-up monitoring within 30 calendar days (or during the next qualifying runoff event should none occur within 30 days) of implementing corrective action(s) taken pursuant to Part 5.5 in response to an exceedance of a numeric effluent limit contained in this permit. Monitoring must be performed for any pollutant(s) that exceeds the effluent limit. You must continue to monitor, at least quarterly, until your discharge is in compliance with the effluent limit or until DEQ waives the requirement for additional monitoring. You must include the results of follow-up monitoring in the corrective action report.

#### C.4 Reporting

- A. Reporting Results of NELM

1. Submit analytical monitoring results by March 1st of the year following the monitoring period.

2. If required, you must submit NELM results obtained from each outfall associated with industrial activity via the electronic Discharge Monitoring Report (eDMR). Instructions on how to register as a Preparer or Signatory for eDMR, as well as how to prepare and submit eDMR, can be found on DEQ website at <https://www.deq.ok.gov/water-quality-division/electronic-reporting/>. Assistance is also available by contacting DEQ at (405)702-8100 or [deqreporting@deq.ok.gov](mailto:deqreporting@deq.ok.gov).

- B. Annual Comprehensive Site Compliance Evaluation Reporting Requirement

1. An ACSCER using Form 606-005B must be filed each year. The report must be filed by March 1st of each year beginning the year after the effective date of this permit. If your permit becomes effective less than one month from the end of the yearly monitoring period, your first monitoring period starts with the next respective annual monitoring period.

2. The report must include requirements specified in Part C.2 of this Appendix and be certified by an authorized representative of your facility (see Part 7.6)

- C. Visual monitoring results, employee training, inspector certifications/licenses, routine facility inspections and other supporting documentation must be retained with the SWP3. Do not submit unless requested to do so by the Executive Director.

**APPENDIX D – BUFFER REQUIREMENTS**

The purpose of this Appendix is to assist you in complying with the requirements of this permit regarding the establishment of natural buffers or equivalent sediment controls.

**Step 1.**

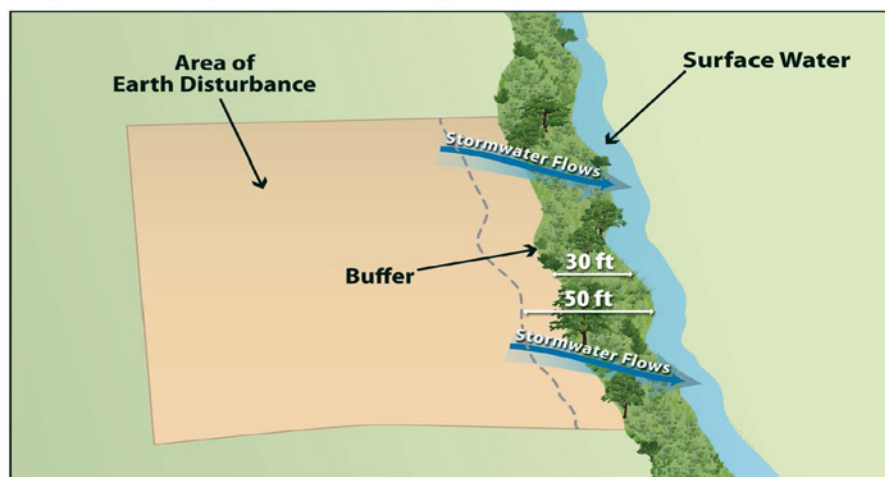
Determine the total width of natural buffer required.

When any waters of the state are located on or immediately adjacent to the site (refer to Figure D-1), you must maintain a natural buffer zone or equivalent erosion and sediment controls from any named or unnamed receiving streams, creeks, rivers, lakes or other water bodies. The minimum width of the buffer is outlined in Table 4-1. If only a portion of the natural buffer is less than the minimum required width, you are only required to implement erosion and sediment controls that achieve the sediment load reduction equivalent to the portion that is not retained (refer to Figure D - 2).

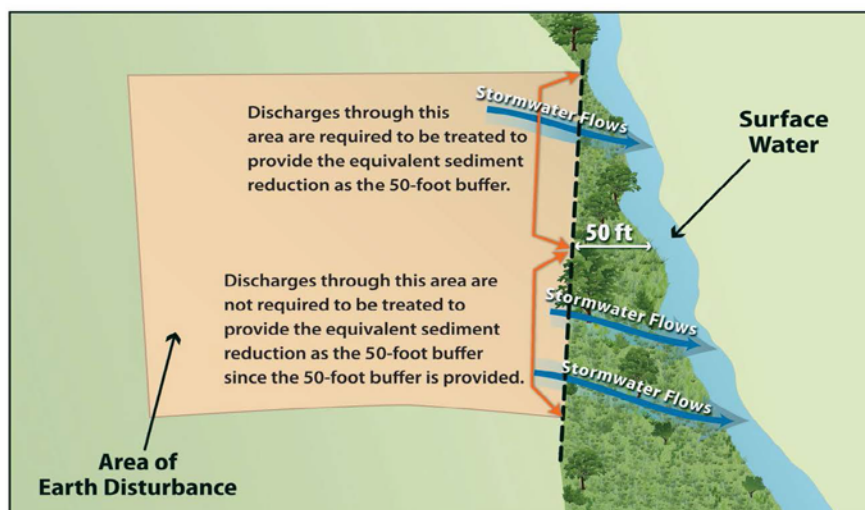
**Table 4-1 Minimum Required Natural Buffer Widths<sup>20</sup>**

Type of Receiving Water	Type of Construction Site	
	Standard	High Priority
Perennial or intermittent streams, creeks, rivers or lakes	50 feet	100 feet
Ephemeral streams or drainages	50 feet	50 feet
Road ditches, county ditches, stormwater conveyance channels, storm drain inlets or sediment basins/impoundments	None	None

**Figure D-1 Example of Earth-Disturbing Activities within 50 feet of surface water.**



<sup>20</sup> Table 4-1. from Part 4.2.B has been duplicated here for reference.

**Figure D-2 Example of how to comply with buffer requirements.**

Where you are retaining a buffer of any size, the buffer should be measured perpendicularly from one of the following points, whichever is further landward from the water:

1. The ordinary high-water mark of the water body (refer to Figure D - 3), defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
2. The edge of the stream or river bank, bluff, or cliff, whichever is applicable (refer to Figure D - 4).

You may find that specifically measuring these points is challenging if the flow path of the surface water changes frequently, thereby causing the measurement line for the buffer to fluctuate continuously along the path of the waterbody. Where this is the case, DEQ suggests that rather than measuring each change or deviation along the water's edge, it may be easier to select regular intervals from which to conduct your measurement. For instance, you may elect to conduct your buffer measurement every five to 10 feet along the length of the water.

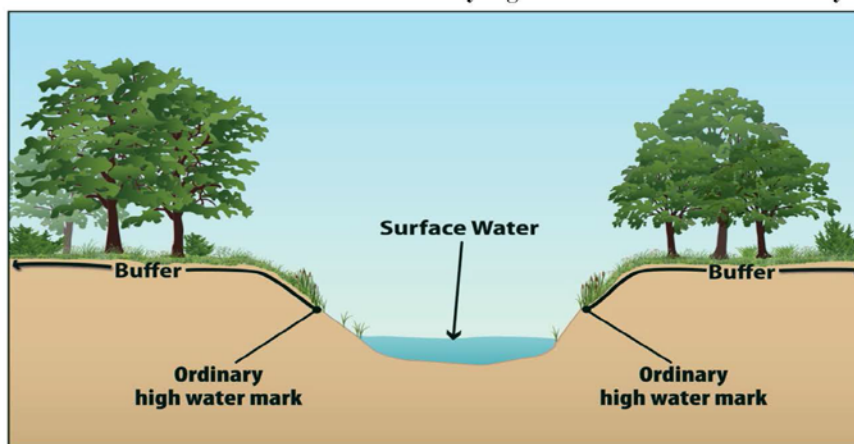
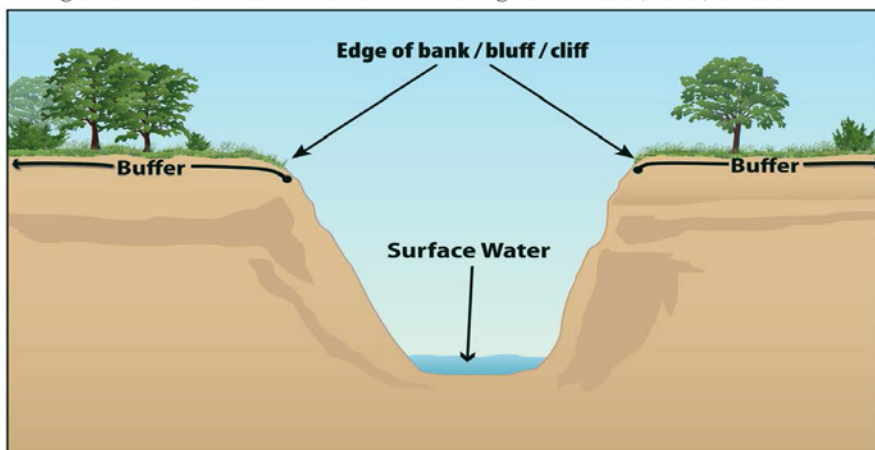
**Figure D-3 Buffer measurement from the ordinary high water mark of the water body.**

Figure D-4 Buffer measurement from the edge of the bank, bluff, or cliff.

**Step 2.**

Determine the amount of natural buffer equivalent required.

If you are retaining a buffer of less than 100 feet or 50 feet, you may take credit for the removal that will occur from the reduced buffer and only need to provide additional controls to make up the difference between the removal efficiency of a 100-foot or 50-foot buffer and the removal efficiency of the narrower buffer. For example, if you are retaining a 30-foot buffer, you can account for the sediment removal provided by the 30-foot buffer retained, and you will only need to design controls to make up for the additional removal provided by the 20-foot of buffer that is not being provided. To do this, you would plug the width of the buffer that is retained into RUSLE or another model, along with other stormwater controls that will together achieve a sediment reduction equivalent to a natural 50-foot buffer.

The amount of natural buffer equivalent required shall be rounded up to the nearest integer of 50 if utilizing the sediment removal efficiency rates in Tables H-1 through H-4.

$$\text{Buffer}_{\text{total}} - \text{Buffer}_{\text{retained}} = \text{Buffer}_{\text{equivalent}}$$

**Step 3.**

Determine the existing sediment removal efficiency of the site.

The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of sediment controls used to reduce the discharge of sediment prior to the buffer. DEQ has simplified this calculation by developing buffer performance tables covering a range of vegetation and soil types for the areas covered by the permit. See Attachment 1, Tables D - 1 through D - 4. Alternatively, you may do your own calculation of the effectiveness of the natural buffer based upon your site-specific conditions and may use this number as your sediment removal equivalency standard to meet instead of using Tables D - 1 through D - 4. This calculation must be documented in your SWP3.

Note: buffer performance values in Tables D - 1 through D - 4 represent the percent of sediment captured through the use of perimeter controls (e.g., silt fences) and 100-foot or 50-foot buffers at disturbed sites of fixed proportions and slopes. Using Tables D - 1 through D - 4 (see Attachment 1), you can determine the sediment removal efficiency of a 100-foot or 50-foot buffer for your geographic area by matching the vegetative cover type and the type of soils

that predominate at your site. For example, if your site is located in Oklahoma City (see Table D - 1), and your buffer vegetation corresponds most closely with that of fescue grass, and the soil type at your site is best typified as sand, your site's sediment removal efficiency would be 90 percent.

If a portion of the buffer area adjacent to the surface water is owned by another party and is not under your control, you can treat the area of land not under control as having the equivalent vegetative cover and soil type that predominates on the portion of the property on which your construction activities are occurring.

Alternatively, you may do your own calculation of the effectiveness of the required buffer based upon your site-specific conditions, and may use this number as your sediment removal equivalency standard to meet instead of using Tables D - 1 through D - 4. This calculation must be documented in your SWP3.

#### Step 4.

Once you have determined the estimated sediment removal efficiency of the required buffer for your site, you must next select stormwater controls that will provide an equivalent sediment load reduction.

To make the determination that your controls and/or buffer area achieve an equivalent sediment load reduction as the required buffer, you may use stormwater controls listed in Tables D -1 through D - 4 to select a designed control(s) or use a model or other type of calculator. There are a variety of models available that can be used to support your calculation, including USDA's RUSLE-series programs and the WEPP erosion model, SEDCAD, SEDIMOT, or other models.

#### Step 5.

Calculate total sediment removal rate efficiency of the selected BMPs. When more than one alternative BMP must be used to compensate for the loss of the buffer strip, this amount should be calculated using the following formula:

$$Removal\ Rate_1 + (1 - Removal\ Rate_1)(Removal\ Rate_2) = Removal\ Rate_{total}$$

For example, if we are installing two BMPs that both have a 70% removal rate, the total removal rate is:

$$0.70 + (1 - 0.70)(0.70) = 0.91 = 91\%$$

#### Step 6.

Compare sediment removal efficiency rates to determine compliance. The equivalent sediment removal efficiency rate (Step 5) must be greater than or equal to the existing sediment removal efficiency rate (Step 3). The final step is to document in your SWP3 the information you relied on to calculate the equivalent sediment reduction as an undisturbed natural buffer. DEQ will consider your documentation to be sufficient if it generally meets the following:

For Step 3: refer to the Table in Attachment 1 that you used to derive your estimated buffer sediment removal efficiency performance. Include information about the buffer vegetation and soil type that predominate at your site, which you used to select the sediment load reduction value in Tables D - 1 through D - 4. Or, if you conducted a site-specific calculation for sediment removal efficiency, provide the specific removal efficiency, and the information you relied on to make your site-specific calculation.

For Steps 4-5: (1) Specify a single designed stormwater control (see Table D - 1 – D - 4) or other stormwater controls that you used to estimate sediment load reductions from your site. Specify a model or other type of calculator that you used to support your calculation if any; and (2) the results of calculations showing how your controls will meet or exceed the sediment removal efficiency from Step 3.

**ATTACHMENT 1**

Sediment Removal Efficiency Tables: Percent of sediment removal was calculated for a 200-foot runoff area with a 100-foot buffer, and a 100-foot runoff area with a 50-foot buffer. DEQ recognizes that very high removal efficiencies, even where theoretically achievable by a 50-foot or 100-foot buffer, may be very difficult to achieve in practice using alternative controls. Therefore in the tables below, DEQ has limited the removal efficiencies to a maximum of 90%. Efficiencies that were calculated at greater than 90% are shown as 90%, and this is the minimum percent removal that must be achieved by alternative controls.

**Best Management Practices Defined:**

- Fescue: Buffer strip (100 feet or 50 feet) at the end of the overland flow path of Fescue grass, the area has not been grazed
- Grama Grass: Buffer strip (100 feet or 50 feet) at the end of the overland flow path of Grama grass, at least the third year after seeding
- Range Grass: Buffer zone (100 feet or 50 feet) at the end of the overland flow path of a generic low production range grass
- Weeds: Buffer zone (100 feet or 50 feet) at the end of the overland flow path of at least five years of growth of generic weeds started from volunteer germination
- 12" Wattle: 12-inch straw sock or wattle installed at the base of the runoff area
- 6" Wattle: Six-inch straw sock or wattle installed at the end of the overland flow path
- Roll Material: Erosion control blanket placed over the disturbed area
- Silt Fence: Full retardance fabric silt fence installed at the end of the overland flow path
- Straw Mulch: Straw mulch applied over the disturbed area, 4,000 lbs/acre
- Gravel Berm: Gravel bag berm installed on a level contour to intercept sheet flows.

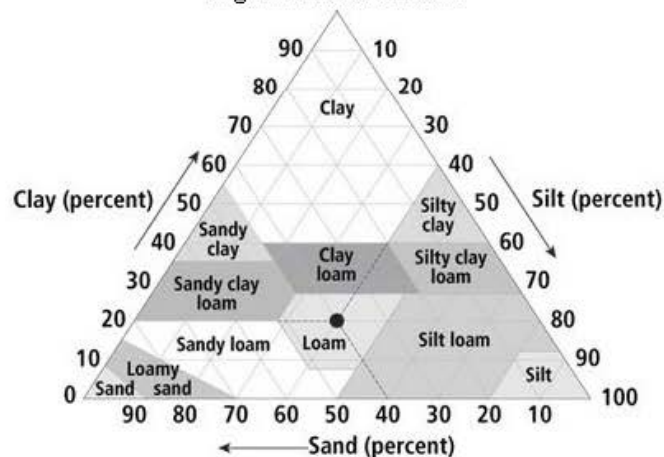
**Figure D-5 Soils Defined**

Table D- 1 Estimated Buffer Performance of Blade Fill in Oklahoma County, Oklahoma

Best Management Practices**	Estimated % Sediment Removal *										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Fescue (50' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Grama Grass (100' Buffer)	80	83	81	82	81	81	80	79	82	85	87
Grama Grass (50' Buffer)	79	79	82	80	81	80	80	79	80	83	76
Range Grass (100' Buffer)	89	87	90	90	90	90	90	90	90	90	89
Range Grass (50' Buffer)	88	86	90	90	90	90	90	90	90	98	87
Weeds (100' Buffer)	68	67	70	71	71	72	73	72	73	73	63
Weeds (50' Buffer)	67	65	69	68	70	71	71	70	72	67	53
12" Wattle	71	61	56	67	45	57	70	20	76	82	73
6" Wattle	61	52	48	59	41	52	68	20	73	66	29
Roll Material	90	90	90	90	90	90	90	90	90	90	90
Silt Fence	61	52	48	59	41	52	68	20	73	66	66
Straw Mulch	76	75	77	73	78	75	77	81	76	77	88
Gravel Bag Berm	80	68	64	75	50	62	74	27	80	84	86

\* Applicable for sites less than nine percent slope

\*\* Characterization focuses on the under-story vegetation

Table D- 2 Estimated Buffer Performance of Blade Cut in Oklahoma County, Oklahoma

Best Management Practices**	Estimated % Sediment Removal *										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Fescue (50' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Grama Grass (100' Buffer)	60	58	74	69	78	77	73	74	72	57	16
Grama Grass (50' Buffer)	59	53	67	62	74	30	69	74	70	38	11
Range Grass (100' Buffer)	87	85	89	90	90	90	90	89	89	86	86
Range Grass (50' Buffer)	85	84	88	89	90	90	90	89	87	84	84
Weeds (100' Buffer)	57	52	62	63	64	64	66	62	26	52	43
Weeds (50' Buffer)	53	51	58	58	62	64	66	62	58	46	39
12" Wattle	63	53	55	65	46	62	75	20	77	54	11
6" Wattle	28	26	45	46	42	58	63	17	38	7	1
Roll Material	83	84	85	83	86	85	85	90	85	86	86
Silt Fence	28	26	45	46	42	58	63	17	38	7	1
Straw Mulch	44	42	45	42	46	44	46	55	43	48	47
Gravel Bag Berm	76	65	61	72	48	62	73	22	77	82	82

\* Applicable for sites less than nine percent slope

\*\* Characterization focuses on the under-story vegetation

Table D- 3 Estimated Buffer Performance of Blade Fill Tulsa County, Oklahoma

Best Management Practices**	Estimated % Sediment Removal *										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Fescue (50' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Grama Grass (100' Buffer)	81	82	82	82	81	81	80	79	82	85	87
Grama Grass (50' Buffer)	79	80	82	82	81	81	80	78	80	84	76
Range Grass (100' Buffer)	90	87	90	90	90	90	90	89	90	90	89
Range Grass (50' Buffer)	88	86	89	90	90	90	90	90	90	88	86
Weeds (100' Buffer)	50	50	48	51	50	50	49	47	51	51	48
Weeds (50' Buffer)	43	48	47	49	48	47	49	45	49	44	40
12" Wattle	68	60	53	65	44	57	69	18	73	80	71
6" Wattle	57	50	47	58	40	53	66	18	71	62	30
Roll Material	90	90	90	90	90	90	90	90	90	90	90
Silt Fence	57	50	47	58	40	53	66	18	71	62	30
Straw Mulch	72	75	75	73	76	74	74	79	92	75	76
Gravel Bag Berm	77	66	60	71	49	62	72	24	77	82	84

\* Applicable for sites less than nine percent slope

\*\* Characterization focuses on the under-story vegetation

Table D- 4 Estimated Buffer Performance of Blade Cut in Tulsa County, Oklahoma

Best Management Practices**	Estimated % Sediment Removal *										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Fescue (50' Buffer)	90	89	90	90	90	90	90	90	90	90	90
Grama Grass (100' Buffer)	60	59	73	68	78	77	73	88	72	56	13
Grama Grass (50' Buffer)	58	55	68	63	76	75	70	73	69	39	11
Range Grass (100' Buffer)	87	85	89	90	90	90	90	87	90	86	85
Range Grass (50' Buffer)	85	84	88	89	90	90	90	88	87	84	84
Weeds (100' Buffer)	52	50	58	59	63	64	66	63	56	42	40
Weeds (50' Buffer)	49	45	45	56	59	61	59	56	49	41	36
12" Wattle	62	55	55	63	45	61	75	20	77	55	8
6" Wattle	25	27	45	50	41	57	63	18	38	6	1
Roll Material	82	83	84	80	86	90	85	90	84	86	86
Silt Fence	40	27	45	50	74	57	63	18	38	6	1
Straw Mulch	35	41	42	27	43	39	40	51	42	43	44
Gravel Bag Berm	73	63	58	69	47	61	70	20	74	79	82

\* Applicable for sites less than nine percent slope

\*\* Characterization focuses on the under-story vegetation

## APPENDIX E – STORMWATER RUNOFF COEFFICIENTS

Table E- 1 Typical Runoff Coefficients for 5- to 10-year Frequency Design

	Description of Area	Runoff Coefficients
Business		
1	Downtown areas	0.70-0.95
2	Neighborhood areas	0.50-0.70
Residential		
3	Single-family areas	0.30-0.50
4	Multiunits, detached	0.40-0.60
5	Multiunits, attached	0.60-0.75
6	Residential (suburban)	0.25-0.40
7	Apartment dwelling areas	0.50-0.70
Industrial		
8	Light areas	0.50-0.80
9	Heavy areas	0.60-0.90
10	Parks, cemeteries	0.10-0.23
11	Playgrounds	0.20-0.35
12	Railroad yard areas	0.20-0.40
13	Unimproved areas	0.10-0.30
Streets		
14	Asphalt	0.70-0.95
15	Concrete	0.80-0.95
16	Brick	0.70-0.85
17	Drives and walks	0.75-0.85
18	Roofs	0.75-0.95
Lawns, Sandy soil		
19	Flat, 2%	0.05-0.10
20	Average, 2-7%	0.10-0.15
21	Steep, 7%	0.15-0.20
Lawns, Heavy soil		
22	Flat, 2%	0.13-0.17
23	Average, 2-7%	0.18-0.22
24	Steep, 7%	0.25-0.35

Viessman, W., Jr., G. L. Lewis, J. W. Knapp, 1989, *Introduction to Hydrology*, 3<sup>rd</sup> ed., Harper and Row, New York.

## APPENDIX F – EFFLUENT LIMITATIONS SUMMARY

Table F- 1 Effluent Limitations Summary

General Requirement	Standard Site	High Priority Site
Part 4.1 Design, Installation and Maintenance Requirements		
Design	Design, install, implement, and maintain effective BMPs that minimize the discharge of pollutants from construction activities by addressing the following while designing your stormwater controls: -precipitation -stormwater volume and velocity -minimizing exposed soil -nature of stormwater runoff and run-on -soil characteristics	
Installation	Ensure that all BMPs are installed in accordance with the manufacture's recommendations or good engineering practices.	
Maintenance	Ensure that all BMPs remain in effective operating condition and are protected from activities that would reduce their effectiveness. Conduct routine inspection, testing, maintenance, and corrective action/repair to avoid breakdowns or failures that may result in discharge of pollutants. Routine maintenance must be completed by the close of the next work day.	
Part 4.2 Sediment and Erosion Controls		
Direct discharges from your stormwater controls to vegetated areas.	Direct discharges from your stormwater controls to vegetated areas of your site and use velocity dissipation devices to prevent erosion.	
Provide and maintain natural buffers and equivalent erosion and sediment controls.	Standard	High Priority
	When any waters of the state are located on or immediately adjacent to the site, you must leave at least 50 feet of natural buffer zone, as measured from the top of the bank to disturbed portions of your site, from any receiving waters.	Buffer must be at least 100 feet for discharges to perennial or intermittent streams, creeks, rivers, or lakes; or at least 50 feet from ephemeral streams and drainages.
	No natural buffer zone is required for discharges to road ditches, county ditches, stormwater conveyance channels, storm drain inlets, or sediment basins/impoundments.	
Install perimeter controls.	Install sediment controls along those perimeter areas of your site that will receive stormwater from earth-disturbing activities.	
Minimize sediment track-out.	You must minimize the sediment track-out onto streets, other paved areas, and sidewalks from vehicles exiting your construction site. To comply with this requirement, you must: 1. Restrict vehicle use to properly designated exit points. 2. Use appropriate stabilization techniques at all points that exit onto paved roads. Implement additional track-out controls as necessary. 3. Where sediment has been tracked-out from your site, you must remove the deposited sediment by the end of the same work day in which the track-out occurs or by the end of the next work day if track-out occurs on a non-work day.	
Control discharges from stockpiled sediment or soil.	For any stockpiles or land clearing debris composed in whole of sediment or soil, you must comply with the following requirements:	

	<ol style="list-style-type: none"> <li>1. Locate the piles outside of any natural buffers and physically separated from any stormwater conveyances, drain inlets, or areas where stormwater flow is concentrated.</li> <li>2. Install a sediment barrier along all down-gradient perimeter areas.</li> <li>3. Provide cover or appropriate temporary stabilization to avoid direct contact with precipitation or to minimize sediment discharge.</li> <li>4. Do not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or surface water.</li> <li>5. Unless infeasible, contain and securely protect from wind.</li> </ol>
Minimize dust.	Minimize the generation of dust through the appropriate application of water or other dust suppression techniques.
Minimize the disturbance of steep slopes.	<p>You must minimize the disturbance of steep slopes (i.e., slopes of 40% or greater). If it is not feasible to avoid disturbance of steep slopes, you must:</p> <ol style="list-style-type: none"> <li>1. Divert concentrated or channelized flows of stormwater away from and around areas of disturbance on steep slopes.</li> <li>2. Use specialized erosion and sediment controls for steep slopes.</li> <li>3. Use stabilization practices designed to be used on steep slopes.</li> </ol>
Preserve topsoil.	You must preserve native topsoil on your site, unless infeasible; you must stockpile and reuse it in areas that will be stabilized with vegetation if applicable.
Minimize soil compaction.	<p>In areas of your site where final vegetative stabilization will occur or where infiltration practices will be installed, you must either:</p> <ol style="list-style-type: none"> <li>1. Restrict vehicle and equipment use in these locations to avoid soil compaction.</li> <li>2. Prior to seeding or planting areas of exposed soil that have been compacted, use techniques that condition the soils to support vegetative growth, if necessary.</li> </ol>
Protect storm drain inlets.	<p>If you discharge to any storm drain inlet that carries stormwater flow from your site directly to surface water you must comply with the following requirements:</p> <ol style="list-style-type: none"> <li>1. Install inlet protection measures that remove sediment from your discharge prior to entry into the storm drain inlet.</li> <li>2. Clean, or remove and replace, the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, you must remove the deposited sediment by the end of the same work day in which it is found or by the end of the following work day if removal by the same work day is not feasible.</li> </ol>
Constructed stormwater conveyance channels.	Design channels to avoid unstabilized areas on the site and minimize erosion of channels and their embankments, discharge points, adjacent streambanks, slopes, and downstream waters during discharge conditions through the use of erosion controls and velocity dissipation devices within and along the length of any constructed stormwater conveyance channel, and at any discharge point to provide a non-erosive flow velocity.
Install sediment basins/impoundments.	<p>If you install a sediment basin, you must comply with the following:</p> <ol style="list-style-type: none"> <li>1. Place velocity dissipation devices at discharge locations and along the length of any outfall channel.</li> <li>2. Provide storage for either the calculated volume of runoff from a two-year, 24-hour storm, or 3,600 cubic feet per acre drained, whichever is greater.</li> <li>3. When discharging from the sediment basin, utilize outlet structures that withdraw water from the surface, unless infeasible.</li> <li>4. Prevent erosion of the sediment basin and the inlet/outlet structures.</li> <li>5. Situate the sediment basin outside of surface waters and any natural buffers.</li> <li>6. Remove accumulated sediment to maintain at least 1/2 the design capacity and conduct all other appropriate maintenance to ensure the sediment basin remains in effective operating condition.</li> </ol>

	A sediment basin is required if 10 or more disturbed acres drain to one common point.	A sediment basin is required if five or more disturbed acres drain to one common point.
Dewatering practices.	You are prohibited from discharging groundwater, spring water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation associated with a construction activity, unless such waters are first effectively managed by appropriate controls. You must also meet the following requirements for dewatering activities: <ol style="list-style-type: none"><li>1. Do not discharge visible floating solids or foam.</li><li>2. Use an oil-water separator or suitable filtration device that is designed to remove oil, grease, or other products if dewatering wastewater is found to contain these materials.</li><li>3. Utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge.</li><li>4. At all points where dewatering water is discharged implement velocity dissipation</li><li>5. With backwash water, either haul away for disposal or return it to the beginning of the treatment process.</li><li>6. Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.</li></ol>	
Part 4.3 Stabilization		
Stabilization deadlines.	Initiate the installation of vegetative or equivalent non-vegetative stabilization measures immediately in any disturbed areas where construction activities have permanently ceased on any portion of the site or will be temporarily inactive for 14 or more calendar days.	
	Complete the installation of stabilization measures as soon as practicable, but no later than 14 calendar days after stabilization measures has been initiated.	Complete the installation of stabilization measures as soon as practicable, but no later than seven calendar days after stabilization measures has been initiated.
Stabilization criteria.	<ol style="list-style-type: none"><li>1. Vegetative stabilization measures must provide uniform cover that provides 70% or more of the cover that is provided by vegetation native to local undisturbed areas. Vegetative stabilization is considered final when vegetation has been established and rooted or anchored in place.</li><li>2. Equivalent non-vegetative stabilization must provide effective cover for exposed areas of the site.</li><li>3. For residential construction, final stabilization occurs when: (a) the homebuilder has completed final stabilization, or (b) the homebuilder has provided temporary stabilization for an individual lot prior to occupation of the home by the homeowner and informed the homeowner of the need for, and benefits of, final stabilization.</li><li>4. Final stabilization in construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land) may be accomplished by returning the disturbed land to its pre-construction agricultural use.</li></ol>	
Part 4.4 Pollution Prevention Requirements		
Spill prevention and response.	Implement preventive measures such as barriers between material storage and traffic areas. Implement procedures for expeditiously stopping, containing, and cleaning up leaks, spills and other releases. Use drip pans and absorbents under or around leaky vehicles. Ensure adequate supplies are available at all times to handle spills, leaks and disposal of any chemicals or materials. Clean up spills immediately using dry clean-up methods and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.	
Emergency Spill Notification	Discharge of a toxic or hazardous substance or oil from a spill or other release is prohibited. Where a leak, spill, or other release containing a toxic or hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 C.F.R. Parts 110, 117, or 302 occurs during a 24-hour period, you must notify the NRC at (800) 424-8802 or, in the areas of Oklahoma, call the DEQ's Hotline at (800)522-0206 as soon as you have knowledge of the discharge. You must also, within seven	

	calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release. Local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies
Minimize exposure.	Store chemicals in water-tight containers. Provide cover to prevent chemical containers and materials from coming into contact with precipitation and stormwater or provide secondary containment or a similarly effective means to prevent the discharge of pollutants.
Good housekeeping.	During each workday, clean up and dispose of waste in designated waste containers. Provide waste containers of sufficient size and number to contain construction and domestic wastes. Waste containers must be covered at the end of daily work shifts and when workers are not present. Clean up immediately if containers overflow.
Chemical applications.	Comply with all application and disposal requirements on the pesticide, herbicide, insecticide, fertilizer, or other chemical manufacturer's label.
Equipment and vehicle washing.	Provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters prior to discharges. Ensure there is no discharge of soaps, detergents, or solvents in equipment and vehicle wash water.
Fertilizers containing nitrogen or phosphorus.	Minimize discharges of fertilizers containing nitrogen or phosphorus by complying with the following requirements: <ol style="list-style-type: none"> <li>1. Apply at a rate and in amounts consistent with manufacturer's specifications.</li> <li>2. Apply at the appropriate time of year for your location, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth.</li> <li>3. Avoid applying before heavy rains that could cause excess nutrients to be discharged.</li> <li>4. Never apply to frozen ground.</li> <li>5. Never apply to stormwater conveyance channels with standing or flowing water.</li> <li>6. Follow all other federal, state, tribal and local requirements regarding fertilizer application.</li> </ol>
Hazardous or toxic waste.	Separate hazardous or toxic waste from construction and domestic waste and store in sealed containers constructed of suitable materials to prevent leakage and corrosion and which are labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable federal, state, or local requirements. Provide secondary containment for containers that will be stored outside or provide a similarly effective means to prevent discharge of pollutants from these areas. Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended methods of disposal and in compliance with federal, state, and local requirements.
PFAS Management	<ol style="list-style-type: none"> <li>1. Implement measures to minimize discharges of PFAS during emergency firefighting activities and post-emergency activities, including clean-up.</li> <li>2. Establish specific protocols for minimizing the resuspension, conveyance, and discharge of PFAS, both during normal operations and during all maintenance and remediation activities.</li> <li>3. Document all activities undertaken in fulfillment of 1 and 2 above in the SWP3.</li> </ol>
Sanitary waste.	Position portable toilets so that they are secure and will not be tipped or knocked over and are located away from water of the state and stormwater inlets or conveyances including streets and roadways.
Washing of applicators and containers.	<p>This applies to stucco, paint, concrete, form release oils, curing compounds, and other chemicals.</p> <ol style="list-style-type: none"> <li>1. Direct all wash water into a leak-proof container or leak-proof pit. The container or pit must be designed so that no overflows can occur due to inadequate sizing or precipitation.</li> </ol>

	<ol style="list-style-type: none"><li>2. Do not dump liquid wastes in storm sewers. Dispose of liquid wastes consistent with your handling of leaks or spills and, for hazardous or toxic waste or oil, in accordance with manufacturer's recommended methods of disposal and in compliance with federal, state, and local requirements..</li><li>3. Remove and dispose of hardened concrete waste consistent with your handling of other construction wasters.</li><li>4. Clean up immediately if there is an overflow or if a discharge occurs outside of the leak-proof container or pit.</li><li>5. Locate any washout or cleanout activities as far away as possible from surface waters and stormwater inlets or conveyances, and, to the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas.</li></ol>
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**APPENDIX I**

**NOTICE OF TERMINATION (NOT)**

## ADDENDUM C – NOTICE OF TERMINATION

<b>DEQ Form</b> <b>606-003</b> <b>Oct. 18, 2017</b>		<b>Oklahoma Department of Environmental Quality</b> <b>Notice of Termination (NOT)</b> <b>for Stormwater Discharges Associated with Industrial or Construction</b> <b>Activity under an OPDES Stormwater General Permit</b>
<p>Submission of this NOT form constitutes notice that the operator identified in Section II of this form no longer intends to be authorized to discharge stormwater associated with industrial or construction activity under an OPDES Stormwater General Permit. Authorization to discharge is not terminated until you are notified that all termination requirements have been met and your complete NOT has been processed by DEQ.</p> <p style="text-align: center;"><b>All necessary information must be provided on this form. See completing instructions on the back of this form.</b></p>		
<b>I. Permit Information</b>		
DEQ Authorization Number: OKR _____ Reason for Termination (check one only): <input type="checkbox"/> A new owner or operator has taken over responsibility for the facility/site/project and has submitted an NOI for permit coverage. <input type="checkbox"/> Stormwater discharge from industrial activity is being terminated under OKR05 permit. <input type="checkbox"/> All construction activities have been completed and met all other requirements under OKR10 permit, including final stabilization, on all portion of the site. <input type="checkbox"/> You obtained coverage under an individual or alternative general permit for all stormwater discharges.		
<b>II. Operator Information</b>		
Operator Name: _____ Phone: _____ Mailing Address: _____ City: _____ County: _____ State: _____ Zip Code: _____ E-mail: _____		
<b>III. Facility/Site/Project Information</b>		
Facility/Site/Project Name: _____ Address: _____ City: _____ County: _____ State: _____ Zip Code: _____ Latitude: _____ Longitude: _____ at the entrance of the Facility/Site/Project <i>(Note: You must include an updated facility map or site map that shows all final plans have been completed with this form.)</i>		
<b>IV. New Operator Information</b>		
New Operator Name: _____ Phone: _____ Address: _____ City: _____ County: _____ State: _____ Zip Code: _____ E-mail: _____ <i>(Note: Use additional sheets of paper if necessary. Permittee is required to prepare a Notification of Change of Ownership (NCO) for each new operator and submit it to DEQ at the change of ownership or with the NOT (see also Part 2.2.3 of this permit).</i>		
<b>V. Certification</b>		
<p><i>I certify under penalty of law that all stormwater discharges associated with industrial or construction activity from the identified facility that was authorized by a general permit have been eliminated or that I am no longer the operator of the facility or construction site. I understand that by submitting this NOT form and upon receiving termination letter from DEQ that the all termination requirements have been met and the complete NOT has been processed, I am no longer authorized to discharge stormwater associated with industrial or construction activity under the General Permit OKR05 or OKR10 to waters of the State. It is unlawful under the Clean Water Act and OAC 252:606-1-3(b)(3)(L) where the discharge is not authorized by an OPDES permit. I also understand that the submittal of this NOT form does not release me as operator from liability for any violations of this Permit or the Clean Water Act.</i></p>		
Print Name: _____ Title: _____ Signature: _____ Date: _____		



## Instructions for Completing NOT Form 606-003 for Stormwater Discharges Associated with Industrial or Construction Activity

### Who May File a Notice of Termination Form

The Permittee currently covered by the OKR05 (Industrial) or OKR10 (Construction) General Permit for stormwater discharges associated with industrial or construction activity must submit a Notice of Termination (NOT) within 30 days after one or more of the following conditions have been met:

- A new owner or operator has taken over responsibility for the facility or site or project, and has submitted an NOI for permit coverage.
- Stormwater discharge from industrial activity is being terminated under the OKR05 permit.
- All construction activities have completed and met all other requirements under the OKR10 permit, including final stabilization, on all portions of the site (See Part 3.3.2.B of the OKR10 permit for specific requirement on final stabilization).
- You obtained coverage under an individual or alternative general permit for all discharges.

You must meet all of the termination requirements of the general permit prior to submitting the NOT.

### Section I. Permit Information

Provide the current OPDES General Permit number assigned to the facility or the site identified in Section II. Indicate your Reason for submitting this NOT by checking the appropriate box.

### Section II. Operator Information

Provide the legal name of the company, firm, public organization or any other entity that operates the facility or site described in this NOT. Provide the operator's phone number, mailing address, and email address.

### Section III. Facility/Site/Project Information

Provide the legal name of the facility or site or project and complete street address, including city, county, state, and ZIP code of the facility or site. If the facility or site lacks a street address, indicate the general location of the facility (e.g., Intersection of State Highways 74 and 34).

Provide the latitude and longitude at the entrance of the facility or the center of site, or the general location information of the facility or site (e.g., Intersection of State Highways 74 and 34). Latitude and Longitude can be obtained online at DEQ and USGS and other mapping tools.

You must also include an updated facility map or site map that shows all disturbed areas over the course of your construction/project (i.e., aerial images or general site maps with project extents marked, including stabilized areas of concrete or asphalt batch plants, equipment staging yards, stockpile, borrow areas, wash-out area, previously disturbed areas etc.) with this form.

### Section IV. New Operator Information

If applicable, provide the legal name of the company, firm, public organization or any other entity that has assumed ownership for the facility or site described in this NOT.

Provide phone number, complete physical address including city, state, ZIP code, and email address. If there is more than one new operator, use additional sheet(s) to include all the new operators' information.

Permittee is required to prepare and submit a Notification of Change of Ownership (NCO) form for each new owner(s) (see Part 2.3.3 of OKR10 for change of ownership requirement). NCO forms may be submitted at the change of ownership or with the NOT.

### Section V. Certification

The NOT form must be signed as follows:

**For a corporation:** by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

**For a partnership or sole proprietorship:** by a general partner or the proprietor, respectively (*Note: for limited liability company (LLC) - by one of its owners, called managing members/partners of the company*);

**For a municipality, state, Federal, or other public facility:** by either a principal executive officer or ranking elected official.

Include the name and title of the person signing the form and the date of signing.

**An unsigned or undated NOT form will not be processed for termination of permit coverage.**

If you have questions, contact the Stormwater Unit of Environmental Complaints and Local Services Division (ECLS) of DEQ at (405) 702-6100 or email to

[ecls-stormwaterpermitting@deq.ok.gov](mailto:ecls-stormwaterpermitting@deq.ok.gov)

### Where to File an NOT form:

Completed NOT must be submitted to the following address:

Stormwater Unit of ECLS, Oklahoma DEQ  
P.O. Box 1677  
Oklahoma City, Oklahoma 73101-1677

or fax it to: (405)702-6226

or email it to: [ecls-stormwaterpermitting@deq.ok.gov](mailto:ecls-stormwaterpermitting@deq.ok.gov)

*Note: Commencing December 21, 2020, all NOTs will be required to be submitted electronically to DEQ. Instructions on how to access and use the appropriate electronic reporting tool will be made available prior to the December 21, 2020 compliance deadline.*

## SECTION 02375 – STONE PROTECTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Rip-rap, bedding, and filter fabric for stone slope protection.
- B. Related Requirements:
  - 1. Section 02300 – Earthwork: Geotextile fabric

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Rip-Rap: Stone for rip-rap shall consist of field stone or rough unhewn quarry stone as nearly uniform in section as is practical. Stones shall be dense, resistant to action of air and water, and suitable for purpose intended. Unless otherwise specified, stones shall weigh between 50 and 150 pounds each, and at least 60 percent of stones shall weigh more than 100 pounds each.
- B. Bedding Stone: Quarried and crushed angular limestone, 6-inches in depth, and with the following gradation:

Sieve Designation	% By Weight Passing Square Mesh Sieves
3"	100
No. 4	20-65
No. 200	0-10

- C. Filter Fabric: Geotextile fabric shall be as specified in Section 02340 and as detailed on Construction Drawings.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Start stabilization only when weather and soil conditions are favorable for successful application of proposed material.
- B. Notify Owner of unexpected subsurface conditions. Discontinue affected work in area until notified to resume work.
- C. Dress slopes and other areas to be protected to line and grade shown on Construction Drawings prior to placing of rip-rap. Undercut areas to receive rip-rap to elevation equal to final elevation less total depth of rip-rap to be placed before placing rip-rap.
- D. Correct areas over-excavated in accordance with Section 02300.
- E. Remove excess excavated material from site.

#### 3.2 PLACEMENT

- A. Place rip-rap in areas where indicated on Construction Drawings.
- B. Install filter fabric and bedding stone prior to placement of rip-rap.

- C. Place stones so that greater portion of weight is carried by earth and not by adjacent stones. Place stones in single layer with close joints. Upright areas of stone shall make angle of approximately 90 degrees with embankment slope. Place courses from bottom of embankment upward, with larger stones being placed in lower courses. Fill open joints with spalls. Embed stones in embankment as necessary to present uniform top surface such that variation between tops of adjacent stones shall not exceed 3 inches.

### 3.3 GEOTEXTILE FABRIC AND/OR GEOGRID

- A. Place geotextile fabric over subsoil surface, lap edges and ends in accordance with manufacturer's recommendations and as shown on the Drawings.

END OF SECTION

## SECTION 02510 - WATER DISTRIBUTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Site water piping and fittings including domestic potable waterline and fire protection system supply waterline, valves, and fire hydrants.
  - 2. All materials shall be in accordance with the specifications listed herein and the requirements of the Coweta. In the event of a conflict, the City's standards shall govern. The contractor shall ensure that only manufactures acceptable to the City of Coweta are used.
- B. Related Requirements:
  - 1. Section 02300 – Earthwork: Trenching, backfill, and compaction for utilities.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):
  - 1. ASME B 16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- C. ASTM International (ASTM):
  - 1. ASTM B88 - Seamless Copper Water Tube.
  - 2. ASTM D1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
  - 3. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
  - 4. ASTM D2564 - Poly (Vinyl Chloride) (PVC) Solvent Cement.
  - 5. ASTM D2672 - Poly (Vinyl Chloride) (PVC) Integrally Molded Bell Ends For Solvent - Cemented Pipe Joints.
  - 6. ASTM D3139 - Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
  - 7. ASTM F477 - Elastomeric Gaskets And Lubricant.
  - 8. ASTM F656 - Poly (Vinyl Chloride) (PVC) Cement Primer.
- D. American Water Works Association (AWWA):
  - 1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
  - 2. AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and other Liquids.
  - 3. AWWA C116 - Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water supply Service.
  - 4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
  - 5. AWWA C153 - Ductile-Iron Compact Fittings for Water Service.
  - 6. AWWA C504 - Rubber-Seated Butterfly Valves.
  - 7. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
  - 8. AWWA C550 - Protective Interior Coatings for Valves And Hydrants.
  - 9. AWWA C600 - Installation of Ductile-Iron Water Mains and Appurtenances.
  - 10. AWWA C605 - Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
  - 11. AWWA C651 - Disinfecting Water Mains.
  - 12. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 Inches Through 12 Inches, for Water Distribution.
- E. National Fire Protection Association (NFPA):
  - 1. NFPA 24 – Installation of Private Fire Service Mains and Their Appurtenances

### 1.3 SUBMITTALS

- A. Furnish 1 copy of results of meter test and hydrostatic pressure test to Owner, Engineer, and utility company upon completion of water distribution backfilling operations.
- B. Project Record Documents:
  - 1. Disinfection report: Record the following:
    - a. Type and form of disinfectant used.
    - b. Date and time disinfectant injection start and time of completion.
    - c. Test locations.
    - d. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
    - e. Date and time of flushing start and completion.
    - f. Disinfectant residual after flushing in ppm for each outlet tested.
  - 2. Bacteriological report: Record the following:
    - a. Date issued, project name, testing laboratory name, address, and telephone number.
    - b. Time and date of water sample collection.
    - c. Name of person collecting samples.
    - d. Test locations.
    - e. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
    - f. Coliform bacteria test results for each outlet tested.
    - g. Certification that water conforms, or fails to conform, to bacterial standards.
    - h. Bacteriologist's signature and authority.
  - 3. Accurately record actual locations of piping mains, valves, connections, and top of pipe elevations.
  - 4. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

## PART 2 - PRODUCTS

### 2.1 PIPE

- A. Pipe sizes 3-inches and smaller for installation below grade and outside building shall comply with one or combination of following:
  - 1. Seamless Copper Tubing (less than 1"): Type "K" soft copper.
  - 2. Seamless Copper Tubing (1.5" – 2"): Type "L" hard copper.
    - a. Fittings: Wrought copper (95-5 Tin Antimony solder joint), ASME B 16.22.
- B. Pipe sizes 4 to 16 inches for installation below grade and outside building shall comply with one or combination of following:
  - 1. Polyvinyl Chloride (PVC) Water Pipe: Pipe, AWWA C900, rated DR 18 (Class 235), continually marked as required.
    - a. Elastomeric gaskets and lubricant: ASTM F477 for smaller pipes.
    - b. Pipe joints: Integrally molded bell ends, ASTM D3139.

### 2.2 VALVES

- A. Gate Valves, 2-Inches and Larger:
  - 1. Manufacturer and Model: Mueller, American Darling, M&H, Clow R/S - Resilient Wedge Gate Valves or approved equal.
  - 2. AWWA C509 R/S "550 Coated Epoxy", iron body, non-rising stem with square nut, single wedge, resilient seat, flanged or mechanical joint ends, control rod, post indicator where indicated on Construction Drawings, extension box and valve key.
- B. Ball Valves, 2-Inches and Smaller:
  - 1. Manufacturer and Model: Mueller Oriseal or approved equal.

2. Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key.
- C. Butterfly Valves, From 2-Inch to 24-Inch: AWWA C504, Iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.
- D. Check Valves, Post Indicator Valves, And Backflow Preventers: Refer to - Fire Suppression Drawings.
- E. Tapping Sleeve & Valves:
  1. Manufactures: Smith Blair, JCM, Ford, Romac – Epoxy coated, stainless steel nuts and bolts or all stainless steel.
- F. Mark manufacturer's name and pressure rating on valve body.

## 2.3 FIRE HYDRANTS

- A. Fire Hydrants: Type as required by utility company/Local Fire Department (Mueler A-423, American Darling B84Btc, Clow Medallion).
- B. Hydrant Extensions: Fabricate in multiples of 6-inches with rod and coupling to increase barrel length.
- C. Hose and Steamer Connections: Match sizes with utility company, with two hose nozzles, one pumper nozzle.
- D. Finish: Apply primer and 2 coats of enamel or special coating to color as required by utility company.

## 2.4 ACCESSORIES

- A. Thrust Blocking: Place 3,000 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 100 psi.

### MINIMUM THRUST BLOCKING BEARING AREAS (UNLESS NOTED OTHERWISE ON SITE DEVELOPMENT PLANS)

Pipe Diameter	Tees Sq. Ft	90° Bend Sq. Ft	45° Bend Sq. Ft	22½° Bend Sq. Ft.	11¼° Bend Sq. Ft.	5 5/8 Bend Sq. Ft.	Cap/Plug Sq. Ft.
3"	1.0	1.0	1.0	1.0	1.0	1.0	1.5
4"	1.0	1.0	1.0	1.0	1.0	1.0	2.0
6"	1.5	2.0	1.0	1.0	1.0	1.0	3.0
8"	2.5	3.5	1.8	1.0	1.0	1.0	4.0
10"	4.0	5.5	2.8	1.5	1.0	1.0	6.0
12"	6.0	8.0	4.0	2.0	1.5	1.0	8.5
14"	8.0	11.0	5.5	3.0	2.0	1.5	12.0
16"	10.0	14.2	7.0	4.0	3.0	2.5	15.0
18"	21.0	21.0	12.0	6.0	4.0	3.5	24.0

- B. Locked mechanical joint fittings shall be installed where vertical changes in direction are required and, if approved by Owner and governing authority, can be installed in lieu of above thrust blocking requirements.
- C. Polyethylene Encasement: Single layer of two ply cross-laminated high density polyethylene encasement per AWWA C105, Section 4.1.2, Type III, Class C (Black), Grade 33, tensile strength 5,000 psi minimum, elongation 100 percent, thickness nominal 0.004 inch (4 mil).
- D. Trace Wire: Magnetic detectable conductor, (THHN 14) brightly colored plastic covering imprinted with "Water Service" in large letters.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that building service connection and municipal utility water main size, location, and depth are as indicated on Construction Drawings.

### 3.2 PREPARATION

- A. Ream pipe and tube ends and remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare pipe for connections to equipment with flanges or unions.
- D. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.

### 3.3 TRENCHING AND BEDDING

- A. Excavate pipe trench and place bedding material in accordance with Section 02300.

### 3.4 INSTALLATION – GENERAL

- A. Perform installation in accordance with utility company or municipality requirements which shall take precedence over requirements stated herein when difference exists.

### 3.5 INSTALLATION - PIPE AND FITTINGS

- A. Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local codes.
- B. Install ductile iron pipe and fittings in accordance with AWWA C600.
- C. Install PVC pipe and fittings in accordance with AWWA C605.
- D. Ductile iron pipe and fittings shall be installed with polyethylene encasement around the pipe for the entire length of the project except where water main is within steel casing or is concrete encased. Install polyethylene encasement in accordance with AWWA C105, Method A.
- E. Install pipe to allow for expansion and contraction without stressing pipe or joints or as specified by pipe manufacturer.
- F. Install access fittings in accordance with local codes to permit disinfection of water system performed under this Section.
- G. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions with least interference with operation of existing pipeline and in compliance with local utility company.
- H. Form and place concrete for thrust blocks or other specified methods of retainage at each change of direction or end of pipe main.
- I. Place pipe to depth in accordance with Section 02300.
- J. Backfill trench in accordance with Section 02300.

- K. Install trace wire continuous over top of non-metal pipe. Bury a minimum of 6 inches below finish grade, and above pipeline.

### 3.6 INSTALLATION - VALVES AND HYDRANTS

- A. Install gate valves as indicated on Construction Drawings. Support valve on concrete pads with valve stem vertical and plumb. Install valve boxes in manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.
- B. Install fire hydrant assemblies as indicated on Construction Drawings in vertical and plumb position with steamer/pumper nozzle pointed perpendicular to traffic where hydrant is adjacent to street, roadway, or parking lot drive or toward protected building unless otherwise directed by local authorities. Support hydrant assembly on concrete pad and firmly brace on side opposite inlet pipe against undisturbed soil and concrete blocking. Place minimum of 6-cubic feet of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Maintain vertical position of hydrant backfilling and compacting.

### 3.7 FLUSHING OF PIPING

- A. Thoroughly flush underground piping from the water supply to the system riser, and lead-in connections to the system riser, before the connection is made to downstream fire protection system piping. Continue flushing for sufficient time to ensure thorough cleaning.
- B. The minimum rate of flow shall be not less than one of the following:
  - 1. 1,560 GPM for 8 in. piping; 2,440 GPM for 10 in. piping; and 3,520 GPM for 12 in. piping.
  - 2. Maximum flow rate available to the system under fire conditions.
  - 3. When supply cannot produce stipulated flow rates, obtain maximum available.

### 3.8 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Perform disinfection of potable lines in accordance with AWWA C651.
- B. Disinfect distribution system with chlorine before acceptance for domestic operation. Chlorine dosage shall be not less than 50 parts per million. Flush lines before introduction of chlorinating materials and after contact period of not less than 24 hours. Flush with clean water after contact period until residual chlorine content is not greater than 1.0 part per million. Flush water discharged from water supply lines or hydrants shall not be allowed to discharge directly onto exposed soil or turf which could result in erosion of soil. If potential for erosion exists at discharge point, measures shall be taken to prevent erosion. Open and close valves in lines being disinfected several times during contact period. After disinfection, take water sample and bacteriological test in accordance with AWWA C651. Do not place distribution system in service until approval is obtained from local governing authorities.
- C. Provide a means of neutralizing the super-chlorinated water before releasing into the environment acceptable to federal, state, and local codes. Direct release to open ground shall not be allowed, unless contained within an on-site detention facility with 6" permanent storage. In this case, the Contractor shall time the release to assure that no rainstorms are imminent. The intent of this condition is to allow the majority of the chlorine to evaporate into the atmosphere before a rainstorm has the opportunity to wash the residual downstream. Contractor shall not release super-chlorinated water directly into the sanitary sewer system, private or public, nor any storm drain system not directly discharging into the detention facility.

### 3.9 SERVICE CONNECTIONS

- A. Provide water service connection in compliance with utility company requirements including reduced pressure backflow preventer (if required) and water meter with by-pass valves and sand strainer.

### 3.10 FIELD QUALITY CONTROL

- A. Test water distribution system pipe installed below grade and outside building in accordance with the following procedures:
  - 1. Perform testing of pipe materials, joints, and other materials incorporated into construction of water mains and force mains to determine leakage and water tightness. In the event state or local code requires more stringent test, more stringent test shall take precedence.
  - 2. Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water. Hydrostatically test at 200 psi, or 50 psi in excess of the system working pressure, whichever is greater, and shall maintain that pressure at +/- 5 psi for 2 hours. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage shall be 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
  - 3. Provide the completed Contractor's Material And Test Certificate For Underground Piping included at the end of this Section.
- B. Prepare reports of testing activities.
  - 1. Contractor shall complete Material and Test Certificate for Underground Piping included at the end of this Section. Additionally, contractor shall ensure minimum requirements of applicable AHJs are also performed and recorded.
  - 2. Report shall include photographs taken by the contractor during testing.

END SECTION

# CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR UNDERGROUND PIPING

Project Number:		Date:	
City, ST:			
Pipe Type and Class:		Type Joint :	
Underground Pipes And Joints	Pipe conforms to NFPA 13/24: <input type="checkbox"/> Yes <input type="checkbox"/> No		
	Fittings conform to NFPA 13/ 24: <input type="checkbox"/> Yes <input type="checkbox"/> No		
	If no explain :		
	Joints anchored clamped, strapped, or blocked in accordance with NFPA 13/24: <input type="checkbox"/> Yes <input type="checkbox"/> No		
	If no, explain:		
Test Description	<p><b>Flushing:</b> Flow the required rate until water is clear and indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 gpm for 4 in. pipe, 880 gpm for 6 in. pipe, 1560 gpm for 8 in. pipe, 2440 gpm for 10 in. pipe, and 3520 gpm for 12 in. pipe. When supply cannot produce stipulated flow rates, obtain maximum available.</p> <p><b>Hydrostatic:</b> All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi or 50 psi in excess of the system working pressure, whichever is greater, and shall maintain that pressure <math>\pm 5</math> psi for 2 hours.</p> <p><b>Hydrostatic Testing Allowance:</b> Where additional water is added to the system to maintain the test pressures required by 10.10.2.2.1, the amount of water shall be measured and shall not exceed the limits of the equation in the <b>Leakage Test</b> section.</p>		
Flushing Test	New underground piping and lead in flushed according to NFPA 13/24: <input type="checkbox"/> Yes <input type="checkbox"/> No		
	If no, explain :		
	How flushing flow was obtained:	Through what type opening:	
	Public water <input type="checkbox"/>	Hydrant butt <input type="checkbox"/>	
	Tank or Reservoir <input type="checkbox"/>	Open pipe <input type="checkbox"/>	
	Fire pump <input type="checkbox"/>		
Hydrostatic Test	All new underground piping hydrostatically tested at _____ psi for _____ hours. If no, explain:	Joints Covered: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Leakage Test	$L = \frac{SD\sqrt{P}}{148,000}$ <p>L= testing allowance, gal per hr S= length of pipe, ft D= nominal diameter of pipe, in. P= Avg test pressure during hydrostatic test, psi</p>		$L = \frac{(\text{_____ ft}) \times (\text{_____ in}) \times \sqrt{(\text{_____})}}{148,000} \text{ psi}$ <p>L= Allowable leakage: _____ gal _____ hrs Leakage measured: _____ gal _____ hrs Leakage actual &lt; leakage allowed? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
Hydrants	Number installed:	Manufacturer & Model:	All operate satisfactorily: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Water control valves left wide open: <input type="checkbox"/> Yes <input type="checkbox"/> No		
	If no, explain:		
	Hose threads of fire department connections and hydrants compatible with AHJ: <input type="checkbox"/> Yes <input type="checkbox"/> No		
Signatures	Contractor Firm & Contact Name:		
	Signature:	Title:	Date:
	AHJ Witness:	Representing:	
	Signature:	Title:	Date:

END OF FORM

02510-7

## SECTION 02535 - SANITARY SEWAGE SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Sanitary sewer drainage piping, fittings, accessories, cleanouts, and bedding.
  - 2. Connection of site sanitary sewer system to municipal sanitary sewer systems.
- B. Related Requirements:
  - 1. Section 02300 – Earthwork: Trenching, backfill, and compaction for utilities
  - 2. Section 02536 - Sewer Manholes, Frames, and Covers

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM):
  - 1. ASTM A74 - Cast Iron Soil Pipe and Fittings
  - 2. ASTM A746 - Ductile Iron Gravity Sewer Pipe
  - 3. ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings
  - 4. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings
  - 5. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
  - 6. ASTM D2241 - Poly (vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
  - 7. ASTM D2657 - Heat-Joining Polyolefin pipe and Fittings
  - 8. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
  - 9. ASTM D3035 - Polyethylene (PE) Plastic Pipe Using Flexible Elastomeric Seals
  - 10. ASTM D3139 - Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals
  - 11. ASTM D3212 – Integrally Molded Bell Fittings
  - 12. ASTM D3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings For Polyethylene Plastic Pipe And Tubing
  - 13. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe
  - 14. ASTM F1417 - Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
- C. American Water Works Association (AWWA):
  - 1. AWWA C111 - Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings
  - 2. AWWA C600 - Ductile-Iron Water Mains And Their Appurtenances
  - 3. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In, For Water Distribution
  - 4. AWWA C901 - Polyethylene (PE) Pressure Pipe, Tubing And Fittings 1/2 Inch Through 3 Inches, For Water Distribution
  - 5. AWWA C906 - Polyethylene (PE) Pressure Pipe And Fittings, 4 Inch Through 63 Inch, For Water Distribution

#### 1.3 SUBMITTALS

- A. Project Record Documents:
  - 1. Accurately record actual locations of pipe runs, connections, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.
  - 3. Testing Reports for all testing as described herein.

#### 1.4 PROJECT CONDITIONS

- A. Coordinate work with termination of sanitary sewer connection outside building and connection to municipal sewer utility service.

## PART 2 - PRODUCTS

### 2.1 SEWER PIPE, FITTINGS, AND JOINTS

- A. Polyvinyl Chloride Pipe (PVC): ASTM D 3034, rated SDR 26 unless otherwise specified by the utility company. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.
  - 1. Pipe joints: Integrally molded bell ends, ASTM D3212, with factory supplied elastomeric gaskets and lubricant.

### 2.2 PIPE ACCESSORIES

- A. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene-ribbed gasket for positive seal.
- B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps, etc.

### 2.3 CLEANOUTS AND MANHOLES

- A. Manholes shall conform to Section 02536.
- B. Lid and Frame: Provide in accordance with Section 02536. Provide traffic grade and rated covers and frames where cleanouts and manholes are within pavement, with the letters "SSCO" or "SANITARY SEWER" respectively cast into the cover.
- C. Shaft Construction: Cast iron shaft of internal diameter as specified on Construction Drawings with 2500 psi concrete collar for cleanouts.

### 2.4 APPURTENANCES

- A. Trace Wire: Magnetic detectable conductor (#12 copper), brightly colored plastic covering, imprinted with "Sanitary Sewer Service" in large letters.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on Construction Drawings.

### 3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with bedding material.
- B. Remove large stones or other hard matter that could damage pipe or impede consistent backfilling or compaction.

### 3.3 BEDDING

- A. Excavate trench and place bedding material in accordance with Section 02300.

### 3.4 INSTALLATION - PIPE

- A. Install type and class of pipe as shown on the drawings. Pipes shall be laid and maintained to the required line and grade with necessary fittings, bends, manhole risers, cleanouts and other appurtenances placed at the required locations. The pipe shall be installed with uniform bearing under the full length of the barrel of the pipe. The pipe shall be inspected for defects and cracks before being lowered into the trench. Defective, damaged or unsound pipe, or pipe that has had its grade disturbed after laying shall be taken up and replaced. Commence installation at lowest point with the bell end upgrade.
- B. No pipe shall be laid in water or when trench conditions are unsuitable for work.
- C. Pipe connecting to manholes or other structures shall terminate flush inside of the structure wall.
- D. Joints for PVC and CISP shall be thoroughly lubricated with an approved lubricant before pipe sections are slipped together. Open ends shall be fully protected with a stopper to prevent earth or other material from entering the pipe during construction. Carefully free interior of the pipe from dirt, cement and other deleterious material as the work progresses.
- E. Maintain separation of potable water main from sewer piping at crossings a minimum of 9 feet horizontal and 24 inches vertical.
- F. Install HDPE piping and fittings to AWWA C901 and C906. Butt fusion welded per ASTM D3261.
- G. Route pipe in straight line parallel to roads, buildings and adjacent utilities and as shown on the drawings.
- H. Establish elevations of buried piping with sufficient cover as recommended by pipe manufacturer to ensure not less than 3 feet of cover, except as noted on drawings.
- I. Backfill trench in accordance with Section 02300.
- J. Install trace wire continuous over top of non-metal pipe. Bury 6 inches minimum below finish grade, above pipe-line.

### 3.5 INSTALLATION – CLEANOUTS AND MANHOLES

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. For cleanouts, form and place cast-in-place concrete base pad with provision for sanitary sewer pipe to be installed to proper elevations.
- C. For manholes, construct inverts according to the following guidelines:
  - 1. Invert channel shall be smooth and accurately shaped to a semicircular bottom to match with the inside of the adjacent sewer section.
  - 2. Invert channels and structure bottoms shall be shaped with mortar and lean concrete.
  - 3. Changes in size and grade of invert shall be made gradually and evenly.
  - 4. Changes in the direction of the sewer entering branch or branches shall have a true curve of as large a radius as the manhole will permit.
- D. For manholes, provide manhole rings, frame, and cover as shown on the construction drawings.

### 3.6 FIELD QUALITY CONTROL

- A. Field quality control shall be conducted by the Contractor as needed to confirm that work is in accordance with contract documents. At a minimum, the contractor will complete the testing as outlined below.
- B. Pipes and joints shall not be completely backfilled until after inspection, testing, and approval by the Owner and local jurisdiction.

- C. Prior to testing for leakage, the pipe trench shall be backfilled to at least the spring line of the pipe. If required to prevent pipe movement during testing, additional backfill shall be added leaving the pipe joints uncovered to permit inspection.
- D. Air Pressure Exfiltration Test: Gravity systems shall be air tested between manholes at 3.5 psi for 5 minutes per ASTM F1417 for plastic pipes.
  - 1. Each section of sewer line between successive manholes shall be tested by plugging the upper and lower ends of the line using pneumatic plugs.
  - 2. The sewer line shall be filled to an air pressure of 4 psi and held for two minutes to allow for stabilization of the air pressure meter. After meter stabilization, the pressure shall be reduced to 3.5 psi and held for 5 minutes per ASTM F-1417 for plastic pipe.
  - 3. The allowable net pressure drop will be 0.5 psi
  - 4. An example Air Pressure Exfiltration Test Report is included in Appendix A. This form contains the minimum air pressure exfiltration testing and reporting standards to meet owner requirements. Contractor shall ensure minimum requirements of applicable AHJs are also performed and recorded.
  - 5. Report shall include photographs taken by the contractor during testing.
- E. Deflection Test:
  - 1. Deflection tests shall be conducted on all plastic pipe using a mandrel with a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.
  - 2. Allowable Deflection: Maximum allowable pipe deflection shall not exceed 5 percent of nominal inside diameter.
  - 3. Mandrel: Mandrel, go/no-go, device shall be cylindrical in shape and constructed with either 9 or 16 evenly spaced arms or prongs. Mandrels with fewer arms will be rejected as not sufficiently accurate. Contact length of mandrel's arms shall equal or exceed nominal inside diameter of sewer to be inspected. Critical mandrel dimensions shall carry tolerance of 0.01-inch maximum. Contractor shall provide mandrel and necessary equipment for mandrel test.
  - 4. Procedure: Mandrel shall be hand-pulled through flexible pipe sewer lines no earlier than 30 days after trench has been completely backfilled. Sections of sewer not passing mandrel shall be uncovered and rebedded, rerounded, or replaced to satisfaction of Owner or governing agency. Repaired section shall be retested.
  - 5. An example Deflection Test Report is included in Appendix A. This form contains the minimum deflection testing and reporting standards to meet owner requirements. Contractor shall ensure minimum requirements of applicable AHJs are also performed and recorded.
  - 6. Report shall include photographs taken by the contractor during testing.
- F. Hydrostatic Test: Force main piping shall be hydrostatically tested at 150 psi in accordance with AWWA C 600.
- G. Provide measuring devices, meters, water, materials, and labor for making the required tests.
- H. Tests shall be conducted in the presence of the Owner or his designee. Test data shall be submitted to the Engineer for review and approval.
- I. All testing shall be completed prior to placing any line in service. The contractor shall be responsible for the safety of all participants and shall follow all OSHA mandated guidelines, including those for Confined Space Entries.

END OF SECTION

# **APPENDIX A**

**TESTING REPORT  
SANITARY SEWER PIPE  
AIR PRESSURE EXFILTRATION TEST**

PROJECT NAME: \_\_\_\_\_

PROJECT NUMBER: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

DATE OF TESTING: \_\_\_\_\_

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ TYPE OF PLUGS USED: \_\_\_\_\_

PIPE SIZE: \_\_\_\_\_ PIPE MATERIAL: \_\_\_\_\_ DISTANCE BETWEEN MANHOLES: \_\_\_\_\_

TESTING TIME (MIN): \_\_\_\_\_ BEGINNING PRESSURE (PSI): \_\_\_\_\_

ENDING PRESSURE (PSI): \_\_\_\_\_ AT \_\_\_\_\_ MIN

NET PRESSURE DROP: \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ TYPE OF PLUGS USED: \_\_\_\_\_

PIPE SIZE: \_\_\_\_\_ PIPE MATERIAL: \_\_\_\_\_ DISTANCE BETWEEN MANHOLES: \_\_\_\_\_

TESTING TIME (MIN): \_\_\_\_\_ BEGINNING PRESSURE (PSI): \_\_\_\_\_

ENDING PRESSURE (PSI): \_\_\_\_\_ AT \_\_\_\_\_ MIN

NET PRESSURE DROP: \_\_\_\_\_ PASS or FAIL (circle one)

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_

TESTING REPORT SHEET \_\_\_\_ OF \_\_\_\_

# TESTING REPORT SANITARY SEWER PIPE DEFLECTION TEST

PROJECT NAME: \_\_\_\_\_

PROJECT NUMBER: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

DATE OF TESTING: \_\_\_\_\_

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_ to MANHOLE # \_\_\_\_\_ PASS or FAIL (circle one)

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_

TESTING REPORT SHEET \_\_\_\_ OF \_\_\_\_

## SECTION 02536 - SEWER MANHOLES, FRAMES, AND COVERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

#### 1.2 Section Includes:

1. Modular precast concrete manhole assemblies.

#### 1.3 Related Requirements:

1. Section 02300 - Earthwork. Excavation, backfill, and compaction.
2. Section 02535- Sanitary Sewer Systems.
3. Section 02630 - Storm Drainage.

#### 1.4 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM):
  1. ASTM A48 - Gray Iron Castings.
  2. ASTM C55 - Concrete Building Brick.
  3. ASTM C94 - Ready Mixed Concrete.
  4. ASTM C478 - Precast Reinforced Concrete Manhole Sections.
  5. ASTM C990 - Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
  6. ASTM D2412 - Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
- C. International Masonry Industry All-Weather Council (IMIAC):
  1. Recommended Practices and Guide Specification for Cold Weather Masonry Construction.
- D. Occupational Safety and Health Administration (OSHA):
  1. OSHA 01926.1153 Respirable Crystalline Silica.
- E. Oklahoma Department of Transportation (ODOT):
  1. Standard Specifications for Highway Construction, 2019 Edition.

#### 1.5 SUBMITTALS

- A. Shop Drawings: Indicate reference to Construction Drawings of manhole locations, elevations, piping with sizes, locations, and elevations of penetrations.
- B. Sanitary Sewer Manhole Vacuum Test Report

### PART 2 - PRODUCTS

#### 2.1 MANHOLES

- A. Precast Concrete: Reinforced precast concrete barrel.
  1. Manhole Sections: ASTM C478.
  2. Joints and Joint Sealant: Joint between manhole barrel sections shall conform to ASTM C990 using preformed flexible joint sealant.
  3. Pipe Connection Sealant: Joint material between manhole barrel and adjoining pipe shall be as shown on the drawings.

4. Construct manholes of precast concrete sections as required by Construction Drawings to size, shape, and depth indicated.
- B. Concrete Brick: ASTM C55, Grade N Type I-moisture controlled, normal weight, of same grade, type and weight as block units, nominal modular size of 3 5/8-inches x 7 5/8-inches x 2 1/4-inches.
- C. Mortar and Grout: Mortar for finishing and sealing shall be Class "C". Honeycombing less than 2-inches deep shall be repaired using Class "D" mortar.
- D. Brick Transition Reinforcement: Formed steel 8-gauge wire with galvanized finish.
- E. Configuration:
  1. Barrel Construction: Concentric with eccentric cone top section.
  2. Shape: Cylindrical.
  3. Clear Inside Dimensions: 48-inches diameter minimum or as indicated on Construction Drawings.
  4. Design Depth: As indicated on Construction Drawings.
  5. Clear Lid Opening: 24-inches minimum for storm sewer structures, and 30 inches minimum for sanitary sewer structures.
  6. Pipe Entry: Provide openings as indicated on Construction Drawings.
  7. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls. Point up irregularities and rough edges with nonshrinking grout.
- F. Inverts: Shape inverts for smooth flow across structure floor as indicated on Construction Drawings. Use concrete and mortar to obtain proper grade and contour. Finish surface with fine textured wood float.

## 2.2 COMPONENTS

- A. Lid and Frame:
  1. Manufacturer: One of the following:
    - a. Bass & Hays Foundry
    - b. Deeter Foundry, Inc.
    - c. Neenah Foundry
    - d. Serampore
    - e. Star
    - f. Sigma
    - g. EJIW
  2. ASTM A48, Class 30B minimum, heavy duty cast iron construction, machined flat bearing surface.
  3. Removable lid, closed or open as indicated on Construction Drawings, with sealing gasket.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify items specified by other Sections are properly sized and located.
- B. Verify that built-in items are in proper location and ready for roughing into work.
- C. Verify that the excavation for manholes is correct.

### 3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves as indicated on Construction Drawings.

### 3.3 PRECAST MANHOLE CONSTRUCTION

- A. Place base pad to proper elevation and location and trowel top surface level for placement of manhole barrel.

- B. Place manhole barrel plumb and level to correct elevations and anchor to base pad.
  1. After completion of slab foundation, lower first joint of manhole barrel into position, grooved end first, and set level and plumb on concrete base. Align and adjust to proper grade prior to placing and forming invert. Pour invert immediately after setting of first section of manhole barrel.
  2. Prior to setting subsequent manhole barrel sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer's recommendations. Place joint sealant on tongue end. Lower next section into position, and remove excess material from interior of structure. Add additional material on exterior of joint, if necessary, for completely watertight joint.
- C. Set cover frames and lids level without tipping, to correct elevations. Utilize pre-cast rings or brick and mortar to achieve final rim elevation. Maximum limit, 4 courses.

### 3.4 FIELD QUALITY CONTROL

- A. Field quality control shall be conducted by the Contractor as needed to confirm that work is in accordance with contract documents. At a minimum, the contractor will complete the testing as outlined below.
- B. Vacuum Test: All manholes shall be vacuum tested in accordance with ASTM C1244-93, Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.
  1. Plug all manhole entrances and exits other than the manhole top access using suitably sized pneumatic or mechanical pipeline plugs and follow all manufacturer's recommendations and warnings for proper and safe installation of such plugs. Plugs should be inserted a minimum of 6" beyond manhole wall.
  2. Install the vacuum tester head assembly at the top access of manhole. (If using a "plate" style manhole tester, position the plate on the manhole ring assembly.)
  3. Attach the vacuum pump assembly to the proper connection on the test head assembly. Make sure the vacuum inlet/outlet valve is in the closed position.
  4. Following safety precautions and manufacturer's instructions, inflate sealing element to the recommended maximum inflation pressure.
  5. Start the vacuum pump and allow pre-set RPM to stabilize.
  6. Open the inlet/outlet ball valve and evacuate the manhole to 10" Hg. (approximately negative 5 psig, 0.3 bar).
  7. Close vacuum inlet/outlet ball valve and monitor vacuum for specified test period (see table). If vacuum does not drop in excess of 1" Hg., manhole is considered acceptable and the manhole passes the test. If manhole fails the test, complete necessary repairs and repeat test procedures until satisfactory results are obtained.
  8. Manholes in asphalted areas cannot be tested until subbase for asphalt has been stabilized.
  9. An example Vacuum Test Report is included in Appendix A. This form contains the minimum vacuum testing and reporting standards to meet owner requirements. Contractor shall ensure minimum requirements of applicable AHJs are also performed and recorded.
  10. Report shall include photographs taken by the contractor during testing.

Depth (ft.)	Diameter (in.)								
	30	33	36	42	48	54	60	66	72
	Times (s)								
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	29	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105

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28	39	42	49	59	69	81	91	101	113
30	42	45	53	65	74	87	98	108	121

- C. Tests shall be conducted in the presence of the Owner or his designee. Test data shall be submitted to the Engineer for review and approval.

END OF SECTION

# **APPENDIX A**

**TESTING REPORT  
SANITARY SEWER MANHOLE  
VACUUM TEST**

PROJECT NAME: \_\_\_\_\_

PROJECT NUMBER: \_\_\_\_\_

INSPECTOR: \_\_\_\_\_

DATE OF TESTING: \_\_\_\_\_

MANHOLE # \_\_\_\_\_

MANHOLE DIAMETER: \_\_\_\_\_ MANHOLE DEPTH: \_\_\_\_\_ REQUIRED TEST TIME: \_\_\_\_\_

INITIAL VACUUM: \_\_\_\_\_ ENDING VACUUM: \_\_\_\_\_ VACUUM LOSS: \_\_\_\_\_

PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_

MANHOLE DIAMETER: \_\_\_\_\_ MANHOLE DEPTH: \_\_\_\_\_ REQUIRED TEST TIME: \_\_\_\_\_

INITIAL VACUUM: \_\_\_\_\_ ENDING VACUUM: \_\_\_\_\_ VACUUM LOSS: \_\_\_\_\_

PASS or FAIL (circle one)

MANHOLE # \_\_\_\_\_

MANHOLE DIAMETER: \_\_\_\_\_ MANHOLE DEPTH: \_\_\_\_\_ REQUIRED TEST TIME: \_\_\_\_\_

INITIAL VACUUM: \_\_\_\_\_ ENDING VACUUM: \_\_\_\_\_ VACUUM LOSS: \_\_\_\_\_

PASS or FAIL (circle one)

COMMENTS: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SIGNATURE: \_\_\_\_\_

DATE: \_\_\_\_\_

TESTING REPORT SHEET \_\_\_\_ OF \_\_\_\_

## SECTION 02630 - STORM DRAINAGE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Storm sewer drainage piping, fittings, and accessories.
  2. Storm drainage structures.

#### 1.2 Related Requirements:

1. Section 02300 – Earthwork: Excavation, trenching, backfill, and compaction.
2. Section 02370 – Erosion and Sedimentation Control (Including SWPPP).
3. Section 02536 - Sewer Manholes, Frames, and Covers.

#### 1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO M 170 – Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
  2. AASHTO M 190 - Bituminous Coated Corrugated Metal Culvert Pipe and Arches.
  3. AASHTO M 252 - Corrugated Polyethylene Drainage Tubing, 3 to 10 Inch Diameter.
  4. AASHTO M 294 - Corrugated Polyethylene Drainage Tubing, 12 to 60 Inch Diameter.
  5. AASHTO M 306 - Drainage, Sewer, Utility, and Related Casting
  6. AASHTO M 330 - Polypropylene Pipe, 300- to 1500-mm (12- to 60-in) Diameter
- C. ASTM International (ASTM):
1. ASTM A 74 - Cast Iron Soil Pipe and Fittings.
  2. ASTM A 185 - Steel welded Wire Fabric, Plain, for Concrete Reinforcement.
  3. ASTM A 615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  4. ASTM A 674 – Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids.
  5. ASTM A 760 - Corrugated Steel Pipe, Metallic-Coated For Sewers And Drains.
  6. ASTM A 796 - Structural Design Of Corrugated Steel Pipe, Pipe-Arches, And Arches For Storm And Sanitary Sewers And Other Buried Applications.
  7. ASTM A 798 - Factory-Made Corrugated Steel Pipe For Sewers And Other Applications.
  8. ASTM C 76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
  9. ASTM C 150 - Portland Cement.
  10. ASTM C 206 - Finished Hydrated Lime.
  11. ASTM C 443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
  12. ASTM C 564 - Rubber Gasket for Cast Iron Soil Pipe and Fittings.
  13. ASTM C 924 - Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
  14. ASTM C 969 - Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
  15. ASTM C 990 - Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
  16. ASTM C 1628 – Joints for Concrete Gravity Flow Sewer Pipe, Using Rubber Gaskets.
  17. ASTM D 2321 - Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
  18. ASTM D 3034 - Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
  19. ASTM D 3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
  20. ASTM F 477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
  21. ASTM F 949 - Poly (Vinyl Chloride)(PVC) Corrugated Sewer Pipe with Smooth Interior and Fittings.
  22. ASTM F 1417 - Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.

23. ASTM F 2306 - 12 to 60 Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
24. ASTM F 2487 – Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene Pipelines.
25. ASTM F 2736 - 6 to 30 in. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe.
26. ASTM F 2764 - 30 to 60 in. Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.
27. ASTM F 2881 - 12 to 60 in. Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications

D. American Concrete Institute (ACI):

1. ACI 301 - Structural Concrete for Buildings.

E. UNI-Bell PVC Pipe Association:

1. UNI-B-6 – Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe.

#### 1.4 SUBMITTALS

A. Project Record Documents:

1. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

#### 1.5 PROJECT CONDITIONS

- A. Coordinate work with termination of storm sewer connection outside building including connection to municipal storm sewer system.

### PART 2 - PRODUCTS

#### 2.1 PIPE AND FITTINGS

- A. Pipe and joint materials specified below for storm drainage shall be strictly limited to the extent shown or allowed on the drawings or as specified in Part 3 hereinafter.
- B. Reinforced Concrete Pipe (RCP): ASTM C 76, Class III unless noted otherwise on Drawings.
1. Joint Material: Provide joints to the extent allowable in Part 3 Joints.
    - a. Rubber O-ring Gasket: ASTM C 443, ASTM C 1628.
    - b. Bitumen or Butyl-Rubber Sealant: ASTM C990.
  2. Flared End Sections: ASTM C 76 or, for sections with toe wall, AASHTO M 170.
- C. High Density Polyethylene Pipe (HDPE): AASHTO M 252 Type S or SP, M 294 Type S or SP, or ASTM F 2306 smooth interior/annular exterior. Use only where specifically indicated on Drawings.
1. Joint Material: As shown in table in Part 3 for the type of joint allowed.
    - a. Rubber Gasket: ASTM F477
    - b. Rubber Gasket Joints: ASTM 3212.
    - c. Corrugated Coupling Bands: As recommended by manufacturer.
- D. Polyvinyl Chloride (PVC) Pipe: ASTM D 3034, rated SDR 35, or ASTM F 949 for Profile Pipe, continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D3034 classification. Only permitted when specifically indicated on Drawings. PVC is only permitted in pipes 15" in diameter or less.
1. Joint Material: As shown in table in Part 3 for the type of joint allowed.
    - a. Rubber Gasket: ASTM F477
    - b. Rubber Gasket Joints: ASTM 3212.

- E. Spiral Rib Metal Pipe: ASTM A760 Type 1R or Type IIR. Coatings shall meet requirements of ASTM A 929 and shall be galvanized, aluminized, or bituminous coated as specified on Drawings. Use only where specifically indicated on Drawings.
1. Pipe gauge shall be as specified on construction drawings or if no gauge is given then the minimum gauges are as follows: 15" to 42" diameter round pipe – 16 gauge (0.064"), 48" to 60" round pipe – 14 gauge (0.079"), 66" to 78" round pipe – 12 gauge (0.109"), 15" to 30" pipe arch – 16 gauge (0.064"), 36" to 42" pipe arch – 14 gauge (0.079"), and 48" to 78" pipe arch – 12 gauge (0.109"). Gauges for larger diameters shall be indicated on the drawings. Standard corrugated steel pipe (CMP or CSP) shall not be substituted for Spiral Rib Metal Pipe.
  2. Acceptable manufacturers: Provide the following:
    - a. Ultra Flo or Ultra Flo II by Contech, Inc.
    - b. Max Flow by Southeast Culvert, Inc.
    - c. Max Flow by St. Regis Culvert, Inc.
    - d. Max Flow by Thompson Culvert, Inc.
  3. Joint Material: Provide joints to the extent allowable in Part 3 Joints.
    - a. Semi-corrugated "Hugger" type bands and "O" ring gaskets.
- F. Subdrains: Perforated, PVC or flexible corrugated HDPE pipe as specified herein of the size indicated on the drawings.

## 2.2 ACCESSORIES

- A. Encasement for Piping: ASTM A 674. Where required for corrosion protection for underground iron pipe and fittings.
1. Material: High-density, crosslaminated polyethylene (PE) film of 0.004-inch (0.10-mm) minimum thickness.
  2. Form: Sheet or tube.
  3. Color: Black.

## 2.3 DRAINAGE STRUCTURES

- A. Manholes: Conform to Section 02536.
- B. Grates and Frames: Provide in accordance with details shown on Drawings or approved equivalent by one of the following acceptable manufacturers. Project needs vary depending on geographic region. To be connected with the best suited supplier, contact the manufacturer whose territory is nearest Project location.
1. Acceptable Manufacturers:
    - a. US Foundry (An Eagle Manufacturing Co.).
    - b. EJ Infrastructure Access Solutions d/b/a. East Jordan Iron Works.
    - c. D&L Foundry and Supply
    - d. Deeter Foundry.
    - e. Neenah Foundry.
  2. Standard Grates and Frames: Heavy duty grates, AASHTO M 306 load rating of H-20.
- C. Cement Mortar used for paving inverts, filling lift holes, joints, patching and anchoring castings shall consist of one part Portland cement, type I, ASTM C 150, 1/4 part hydrated lime, ASTM C 206 and 2-1/2 parts clean, well-graded sand and water free of suspended matter, alkali, and containing no industrial or domestic waste.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

### 3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over-excavation with bedding material.
- B. Remove large stones or other hard matter that could damage piping or impede consistent backfilling or compaction.
- C. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.

### 3.3 INSTALLATION – PIPE

- A. Install type of pipe shown on the drawings. Where type of pipe material is not shown or restricted on the drawings, provide only RCP. Installation provisions herein shall apply to the extent as applicable to the pipe and joints allowed.
- B. Inspect pipe for defects and cracks before being lowered into the trench, piece by piece. Remove and replace defective, damaged or unsound pipe or pipe that has had its grade disturbed after laying. Protect open ends with a stopper to prevent earth or other material from entering the pipe during construction. Remove dirt, excess water, and other foreign materials from the interior of the pipe during the pipe laying progress.
- C. Excavate pipe trench and place bedding material in accordance with Section 02300.
- D. All pipes that penetrate levees, including permanent outlet control devices and temporary discharge pipes from sedimentation basins, shall be constructed in conjunction with fill placement to ensure these drainage devices are properly placed and the surrounding backfill is adequately tied into the basin levee. Trenching of levees is not permitted. All materials in the levee, including bedding materials for the discharge devices, shall be low permeability, cohesive soils. Soil exhibiting high shrink/swell potential or containing greater than 5% organics shall not be used.
- E. Install pipe in accordance with manufacturer's written recommendations.
- F. Thermoplastic Pipe: Install pipe in accordance with pipe manufacturer's installation instructions and ASTM D 2321 and as indicated on the drawings.
- G. Spiral Rib Metal Pipe: Install as indicated on the drawings, as recommended by the manufacturer, and in accordance with ASTM A 798 and A 796 as they apply.
- H. HDPE Pipe: Install pipe in accordance with pipe manufacturer's installation Guidelines for Culvert Storm Drainage Applications and as indicated on the drawings.
- I. Install polyethylene corrosion-protection encasement around iron piping as indicated on the drawings, as recommended by the manufacturer, and in accordance with ASTM A 674.
- J. Commence installation at the lowest point for each segment of the route. Lay RCP with the groove or bell end upstream.
- K. Lay pipe to the required line and slope gradients with the necessary fittings, bends, manhole, risers and other appurtenances placed at the required location as noted on Drawings.
- L. Do not displace or damage pipe when compacting.
- M. Do not place pipe in water or when trench conditions are unsuitable for such work.
- N. Joints: Construct joints as described herein and in accordance with manufacturer's installation instructions. Provide pipe joint type for silttight or watertight only joint performance in accordance with the following table. Rubber gasketed joints shall conform to ASTM D 3212. The table applies only to the extent as applicable to the pipe and joint type and the joint performance as shown or specified.

Pipe and Joint Type	Joint Performance		
	Watertight	Silttight	Soiltight
<b>RCP</b>			
Rubber O-Ring Gasket	X	X	
<b>HDPE</b>			
Rubber Gasket	X	X	
<b>PVC</b>			
Rubber Gasket	X	X	
<b>Spiral Rib Aluminum Pipe</b>			
Hugger Band w/ O Ring Rubber Gasket		X	

### 3.4 INSTALLATION – MANHOLES, CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Construct drainage structures in accordance with details shown on Drawings and in accordance with Section 02536 as applicable.
- B. Precast Sections:
  1. Install precast section with bases in accordance with Section 02300 and 02536 or as shown on drawings.
  2. Align pipe openings to that of the pipe entering and leaving the manhole, etc. Properly Pipe with connections to manholes, etc. as shown on the drawings.
- C. Invert channels shall be smooth and accurately shaped to a semicircular bottom conforming to the inside of the adjacent sewer section. Shape invert channels and structure bottoms with cement mortar. Changes in size and grade of invert shall be made gradually and evenly. Changes in direction of the sewer entering branch or branches shall have a true curve of as large a radius as the manhole will permit.
- D. Frames and Covers:
  1. Set frames and covers to the proper elevation. Firmly embed frames in mortar approximately 1 inch thick and align to fit the top section of the structure.
  2. Limit bricks set in mortar and used to adjust the frame to finished grade to no more than four courses.
  3. Adjustment rings used to make adjustments in grade shall be made with the initial ring embedded in mortar and the exterior of the rings pargeted with mortar not less than 1/2 inch thick. No adjustment made in this manner shall exceed 8 inches.
- E. Construct concrete cradles as shown on the drawings and in accordance with the strength requirements of Section 03311 as needed when crossing over and under sewer pipe or utility lines.

### 3.5 SUBDRAINS

- A. Install subdrains in accordance with the details and at the locations shown on the drawings.

### 3.6 INSPECTION AND TESTING

- A. General:
  1. Clean, inspect, and test Strom sewer systems and culverts, upon completion or at such time as directed. The system or culvert shall have a true grade and line. Actual elevations shall be within 0.08 feet of the elevations given on the drawings.

2. After completion of the Work, or any part thereof, the job shall be tested to determine that it has been installed in accordance with the drawings and specifications. In general, the Work shall prove to be in good condition, installed in accordance with the drawings and specifications and ready for use.
- B. Cleaning and Testing:
1. Visibly inspect and remove all debris and obstructions from storm pipe.
  2. Test watertight joints in accordance with the requirements of jurisdictional authorities, UNI-B-6 and the following:
    - a. Option: Test plastic piping according to ASTM F 1417 or ASTM F 2487.
    - b. Option: Test concrete piping according to ASTM C 924 or ASTM C 969.
- C. Alignment Test: After backfill has been placed and compacted to a depth not less than one foot above top of pipe, a visual inspection shall be made by flashing a light between manholes. Correct displacement or misalignment of invert.

END OF SECTION

## SECTION 02715 - BASE COURSE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Aggregate base for asphaltic concrete including sand/shell base and hot-mix sand asphalt base.
- B. Related Requirements:
  - 1. Section 02300 – Earthwork: Excavation, Backfill, and Compaction for Pavement subgrade.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM):
  - 1. ASTM D698 – Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbs/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  - 2. ASTM D1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbs/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
- C. Asphalt Institute.
- D. Oklahoma Department of Transportation (ODOT):
  - 1. Standard Specifications for Highway Construction, 2019 Edition.

#### 1.3 SUBMITTALS

- A. Submit materials certificate to the Owner's Civil Engineering Consultant and the Owner's Construction Testing Laboratory, signed by materials producer and Contractor, certifying that materials comply with, or exceed, requirements specified herein or on the Construction Drawings.
- B. Submit certification of base course materials and placement as specified in Parts 2 and 3 hereinafter.

#### 1.4 WEATHER LIMITATIONS

- A. Do not place aggregate when base surface temperature is less than 40 degrees F, nor when air temperature is below 45 degrees F. Do not place aggregate when surface is wet or frozen. Do not place aggregate when weather conditions are unfavorable otherwise.

### PART 2 - PRODUCTS

#### 2.1 BASE COURSE MATERIAL

- A. Aggregate Base Course: Aggregate base course shall consist of a well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction. Base course may consist of a granular base (crushed slag, stone, or gravel, etc), sand/shell base material, or a hot-mix sand asphalt base.
- B. Base course shall be as shown on the drawings, or when not shown, shall be as specified herein.
- C. Aggregate base material requirements from State or other local highway agency specifications may be used for aggregate base course for roads, streets, or similar use pavements if the following conditions are met:
  - 1. Percentage of material by weight passing the No. 200 sieve will not exceed 10.

2. Portion of the material passing the No. 40 sieve must have a liquid limit not greater than 25 and a plasticity index not greater than 5.
- D. Aggregate shall consist of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, angular sand, or other approved material. Aggregate shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.
1. Coarse aggregates shall be angular particles of uniform density.
  2. Fine aggregates shall be angular particles of uniform density. Fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.
- E. Gradation: Gradation shall be in conformance with the paving section information shown on the construction drawings.
- F. Hot-mix Sand Asphalt Bases: Asphalt Institute Type VI, VII, or VIII Mixes for Hot-mix Sand Asphalt Bases. Hot-Mix base shall be used only under asphaltic concrete surfaces.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Contractor shall verify to the Owner in writing that the subgrade has been inspected, tested, and gradients and elevations are correct, dry, and properly prepared in accordance with Section 02300.

#### 3.2 CONSTRUCTION

- A. Perform base course construction in accordance with the applicable State standard specifications or as shown or specified.
- B. Perform base course construction in a manner that will drain the surface properly and prevent runoff from adjacent areas from draining onto base course construction.
- C. Compact base material to not less than 95 percent of optimum density, as determined by ASTM D1557 unless otherwise indicated on the Drawings.
- D. Construct to thickness indicated on Construction Drawings. The minimum base thickness as shown on drawings shall be achieved throughout all pavement areas.
1. Granular Base: Apply in lifts or layers not exceeding 8-inches, measured loose.
  2. Hot-mix Sand Asphalt Bases: Apply in lifts or layers not exceeding 3-inches, measured loose.

#### 3.3 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor as necessary to assure compliance with Contract requirements. Owner T&I shall not be considered a substitute for the Contractor's responsibility to perform similar routine, necessary, and customary testing and inspection of the methods and frequency suitable for the type of work involved.
- B. Mandatory Testing and Inspection:
1. Measure base course tolerances no more than 25 ft. on center with a rod and level or stringline.
  2. Certify in writing to the Owner that base course placement is in accordance with Contract Document requirements prior to subsequent work thereon.

END OF SECTION

## SECTION 02740 - ASPHALT CONCRETE PAVING

### GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Asphalt concrete binder and surface course.
- B. Related Requirements:
  - 1. Section 02300 - Earthwork.
  - 2. Section 02715 - Base Course.
  - 3. Section 02765 - Pavement Markings.
  - 4. Section 02770 - Curbs and Sidewalks.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. The Asphalt Institute (AI):
  - 1. MS-2 - Mix Design Methods For Asphalt Concrete And Other Hot-Mix Types.
- C. Oklahoma Department of Transportation (ODOT):
  - 1. Standard Specifications for Highway Construction, 2019 Edition.
- D. ASTM International (ASTM):
  - 1. ASTM D1188 - Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.
  - 2. ASTM D2041 - Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.
  - 3. ASTM D2950 - Density of Bituminous Concrete in Place by the Nuclear Methods.
  - 4. ASTM D2726 - Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixture.
  - 5. ASTM D5444 - Mechanical Size Analysis of Extracted Aggregate.
- E. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO M017 - Mineral Filler for Bituminous Paving Mixtures.
  - 2. AASHTO M140 - Emulsified Asphalt.
  - 3. AASHTO M208 - Cationic Emulsified Asphalt.
  - 4. AASHTO M320 - Performance-Graded Asphalt Binder
  - 5. AASHTO M323 - Superpave Volumetric Mix Design
  - 6. AASHTO T164 - Quantitative Extraction of Asphalt Binder from Hot-Mix Asphalt (HMA)
  - 7. AASHTO T166 - Bulk Specific Gravity of Compacted Hot-Mix Asphalt Mixtures Using Saturated Surface-Dry Specimens
  - 8. AASHTO T209 - Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt (HMA)
  - 9. AASHTO T245 - Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
  - 10. AASHTO T275 - Bulk Specific Gravity of Compacted Hot-Mix Asphalt Mixtures Using Paraffin-Coated Specimens
  - 11. AASHTO T308 - Asphalt Content of Hot-Mix Asphalt (HMA) by the Ignition Method.
  - 12. AASHTO T312 - Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor.
  - 13. AASHTO T331 - Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
- F. National Asphalt Pavement Association (NAPA):
  - 1. IS 123 - Recycling Hot-Mix Asphalt Pavements
  - 2. IS 128 - HMA Pavement Mix Type Selection Guide

G. Occupational Safety and Health Administration (OSHA):

1. OSHA 01926.1153 Respirable Crystalline Silica.

1.3 QUALITY ASSURANCE

A. Pre-installation Meeting: Convene a pre-installation meeting at the site at least two weeks prior to commencing work of this Section. Require attendance of parties directly affecting work of this Section, including, but not limited to, the Owner's representative, CTL's representative and inspector, Contractor, paving sub-contractor and job foreman.

1. Contact Owner three weeks prior to pre-installation conference to confirm schedule.
2. Record discussions of meeting and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to paving work, including the following:
  - a. Review preparation and installation procedures and coordinating and scheduling required with related work.
  - b. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
  - c. Tour, inspect and discuss condition of subgrade, drainage structures, and other preparatory work.
  - d. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
  - e. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - f. Review paving requirements (drawings, specifications and other contract documents).
  - g. Review required submittals, both completed and yet to be completed.
  - h. Review required inspections, testing procedures.
  - i. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
  - j. Review safety precautions relating to placement of paving.

1.4 SUBMITTALS

A. Submit mix designs to the Civil Engineering Consultant of Record at least 30 days prior to beginning asphalt paving operations. Mix designs over one year old will not be accepted by Owner. Mix design submittal shall follow the format as recommended by Asphalt Institutes Manual MS-2 and include the following:

1. Type and Name of mix.
2. Gradation Analysis.
3. Optimum asphalt content.
4. Grade of asphalt binder.
5. Volumetric properties.
6. References to local State Highway Department Specification for each material when applicable.

B. Submit approved mix designs and laboratory test results to CTL signed by the materials producer and Contractor certifying materials and mix ratios conform to the requirements specified herein.

C. Submit certification of asphalt placement as specified in Field Quality Control.

1.5 PROJECT CONDITIONS

A. Weather Limitations:

1. Apply tack coat when ambient or base surface temperature is above 40 F, and when temperature has been above 35 F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, during rain, or when frozen.
2. Construct asphalt concrete paving when ambient temperature is above 40 F.

B. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

## PRODUCTS

### 2.1 MATERIALS

- A. Aggregate: Use locally available materials and gradations that meet local State Highway Department Specifications and exhibit satisfactory records of previous installations. All aggregate requirements, including those for quality, shall meet those in AASHTO M323 for the specified traffic level.
- B. Asphalt Binder: Asphalt binder shall be a performance-graded (PG) binder, meeting the requirements of M320, which is appropriate for the climate and traffic-loading conditions at the site of the paving project and in compliance with the local State Highway Department Specifications for that location, or as specified by the contract documents.
  - 1. Design reliability shall be 85% for the high- and low-temperature performance.
  - 2. The minimum required PG binder shall be that which satisfies the required design reliability using the pavement temperature data determined.
- C. Tack Coat: Emulsified asphalt; AASHTO M140 or AASHTO M208, SS-1h, CSS-1, or CSS-1h, may be diluted with up to 1 part water to 1 part asphalt.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M17, if recommended by local State Highway Department Specifications.
- E. Reclaimed Asphalt Pavement (RAP): RAP may be used in amounts not to exceed 20% by wt. The mix design shall contain the percentage of RAP that is to be used in the production. Production procedures using RAP material shall conform to NAPA IS 123. Additional RAP provisions shall be as follows:
  - 1. Material-handling machinery shall not drive on the RAP stockpiles.
  - 2. RAP maximum top size aggregate introduced into the mix shall be 1-1/2 inches.
  - 3. Dust (fines) in the RAP, when added to the virgin aggregate, shall not exceed the requirements of the virgin mix design.
  - 4. Moisture content shall be monitored to assure that the material can be thoroughly dried as it is processed.
  - 5. Stockpiles shall be left uncovered or stored under the roof of an open-sided building.
  - 6. Material handling front-end loader operators shall be experienced in handling RAP materials.
  - 7. RAP shall be loaded in the cold feed bins in small consistent quantities without causing the material to compact in the bin.
  - 8. RAP shall not be held in the bin for extended periods of time, especially on hot, humid days.
  - 9. During production, RAP material shall not be allowed to contact open flame.

### 2.2 AGGREGATE SIZE REQUIREMENTS

- A. Aggregate gradation shall be as specified by ODOT Standard Specifications.

### 2.3 ASPHALT-AGGREGATE MIXTURE

- A. Mix Design:
  - 1. The initial, design, and maximum number of gyrations shall conform to the ODOT design standards.
  - 2. The design, when compacted the relative density, VMA, VFA, and dust-to-binder ratio requirements specified..
  - 3. Pavement design values, tolerances, and properties not specified within this specification shall be in accordance with the ODOT Standard Specifications. In the case of a conflict, the more stringent requirements shall apply.

## EXECUTION

### 3.1 EXAMINATION

- A. Verify that the prepared base material has been inspected, tested, and gradients and elevations are correct, dry, and properly prepared in accordance with Section 02715.

### 3.2 PREPARATION

- A. Proof roll prepared base material surface to check for unstable areas in accordance with Section 02300 including documentation and re-proof rolling as required. Paving work shall begin only after unsuitable areas have been corrected and are ready to receive paving.
- B. Establish and maintain required lines and elevations.
- C. Cover the surfaces of curbs, gutters, manholes and other structures on which the asphalt concrete mixture will be placed, with a thin, uniform coat of liquid asphalt. Where the asphalt concrete mixture will be placed against the vertical face of an existing pavement, clean the vertical face to remove foreign substances and apply a coating of liquid asphalt at a rate of approximately 0.25 gallons per square yard.
- D. Density Control Strips.
  - 1. Prior to beginning placement of asphalt, construct asphalt concrete density control strips.
  - 2. Source and type of material, material requirements, and laydown and compaction equipment used for compaction shall be the same as that to be used in the project.
  - 3. The subgrade or pavement layer upon which the control strip is constructed shall be tested prior to construction of the control strip.
  - 4. The control strip shall be a minimum of 250 linear feet long and one paver width wide unless approved in writing by the Engineer.
  - 5. Rolling the control strip shall continue until no appreciable increase in density is obtained by additional coverages.
  - 6. Upon completion of rolling, the Contractor shall use a nuclear testing device to establish the mean density of the control strip. The mean density will be based on 10 tests taken at randomly selected sites within the control strip area. The nuclear gauge will be calibrated with the average of 3 cores taken from the same area. The average of the cores shall meet the specified density requirements with no individual test less than 91 percent. The calibration factor between the average nuclear density and average core density shall be applied to the Contractor's nuclear gauge for Contractor's density monitoring.
- E. Equipment:
  - 1. Equipment necessary for the paving of asphalt concrete shall be on the project prior to beginning paving operations.
  - 2. Maintain equipment in satisfactory operating condition and correct breakdowns in manner that will not delay or be detrimental to the schedule of paving operations.

### 3.3 APPLICATION

- A. Tack Coat:
  - 1. Apply to contact surfaces of previously constructed asphalt concrete base courses or Portland cement concrete and surfaces abutting or projecting into asphalt concrete or into asphalt concrete pavement.
  - 2. Apply tack coat to asphalt concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat between each lift or layer of full depth asphalt concrete and sand asphalt bases and on surface of bases where asphalt concrete paving will be constructed.
  - 3. Apply at rate which produces a residual of asphalt cement between 0.04 and 0.06 gal per sq. yd of surface.
  - 4. Allow drying until at proper condition to receive paving.

### 3.4 ASPHALT CONCRETE PLACEMENT

- A. Place asphalt concrete mixture on completed, compacted underlying surface, spread, and strike off. Spread mixture at the minimum ambient temperature that will allow the required density to be achieved.
- B. Whenever possible, spread pavement by finishing machine; however, inaccessible or irregular areas may be placed by hand methods. Spread hot mixture uniformly to required depth with hot shovels and rakes. After spreading,

carefully smooth hot mixture to remove segregated course aggregate and rake marks. Rakes and lutes used for hand spreading shall be type designed for use on asphalt mixtures. Do not dump loads faster that they can be properly spread. Workers shall not stand on loose mixture while spreading.

- C. Placement and routing of hauling and placing equipment shall be conducted in a manner to avoid tire tracking of bituminous material onto existing paved surfaces.
- D. Paving Machine Placement: Apply successive lifts of asphalt concrete in transverse directions except when placing within small areas, parallel lifts may be placed when considered more practical. Joints of successive parallel lifts shall be offset a minimum of 2 feet. Place surface course parallel to flow of traffic. Place asphalt paving in typical strips not less than 10'-0" wide. Asphalt concrete pavement, including base and surface course, shall be placed in two or more lifts as indicated on drawings. Pavement thicknesses shall be thickness shown on the drawings for each course but not less than 1-1/2 inch nor more than 3 inches for each lift.

### 3.5 ROLLING AND COMPACTION

- A. After being spread, mixture shall be compacted by rolling as soon as it will bear the weight of rollers without undue displacement. Number, weight, types of rollers, and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in workable condition.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Perform breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling with hot material.
- D. Intermediate Rolling: Follow breakdown rolling as soon as possible while mixture is hot. Continue second rolling until mixture has been thoroughly compacted as follows:
  - 1. Minimum Average Density: 93 percent of theoretical maximum density according to AASHTO T209 or ASTM D2041, with no individual test less than 91 percent nor greater than 97 percent.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
- F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked. Any masked or marred finish surfaces shall be repaired or smoothed.
- H. Compaction at Unsupported Edges of Pavements: Start the first roller pass 12-15 inches from the unsupported edge. Allow the uncompacted asphalt to act as a dike to hold the mat in place. The final pass over the uncompacted dike should not slough off if the roller is supported on the compacted mat.

### 3.6 JOINTS

- A. General: Place each asphalt paving layer as continuous as possible to keep the number of joints to a minimum. Create joints between old and new pavement, between successive days work, and where the mixture has become cold (less than 140 degrees F). Make these joints in such a manner as to create a continuous bond between the old and new pavement construction courses.
- B. Construction joints shall have same texture, density, and smoothness as other sections of asphalt concrete course.
- C. Transverse Joints: If placing of material is discontinued or if material in place becomes cold, make a joint running perpendicular to the direction traveled by the paver. Before placement continues, trim the edge of the previously placed pavement to a straight line perpendicular to the paver and cut back to expose an even vertical surface for the full thickness of the course. When placement continues, position the paver on the transverse joint so that suffi-

cient hot mixture will be spread in order to create a joint after rolling that conforms to the required smoothness. If the temperature of the previously placed pavement material drops below 140 degrees F before paving is resumed, give the exposed vertical face a thin coat of liquid asphalt just before paving is continued.

- D. Longitudinal Joints: Coat longitudinal joints that are not completed before the previously laid mixture has cooled to a temperature below 140 degrees F, with liquid asphalt just before paving is continued.

### 3.7 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor as necessary to assure compliance with Contract requirements. Owner T&I shall not be considered a substitute for the Contractor's responsibility to perform similar routine, necessary, and customary testing and inspection of the methods and frequency suitable for the type of work involved.
- B. Mandatory Contractor Testing:
  - 1. Pavement Thickness: Measure pavement thickness behind the paver at the beginning of and during pavement placing operations to assure proper thickness.
  - 2. Field Density Test For In-Place Materials: In-place density tests by nuclear method in accordance with ASTM D2950. Nuclear density shall be correlated with ASTM D1188 or D2726 or AASHTO T166, T275, T331 as applicable.
    - a. Density tests on subgrades and aggregate base courses to be overlaid by pavements shall be performed within 48 hours prior to placement of the pavement lift. If inclement weather occurs after testing, retest prior to placement of next lift. Testing frequencies shall be as specified in Sections 02300 and 02715 respectively.
- C. Coring holes remaining from cores taken by the CTL shall be immediately filled by the Contractor with full depth, hot-mix asphalt concrete or non-shrink grout tinted to match the surrounding pavement.
- D. Obtain test samples for volumetric testing from the truck at the asphalt plant. Mixture samples shall be taken at least 2 times for every 8 hour day. Deliver samples to the CTL for testing by the CTL:
- E. Areas of deficient paving, including compaction, smoothness, thickness, and asphalt mixture, shall be delineated, removed, and replaced in compliance with specifications requirements. Alternative remedial or corrective measures for repair of deficient paving may be allowed provided a plan of corrective action is submitted in the form of a Request For Information (RFI) and the plan is approved by the Engineer.
- F. Provide certification in writing that asphalt placement is in accordance with specification requirements.
- G. Provide documentation to the CTL of proof rolling and of subgrade and aggregate base compaction testing prior to pavement placement each day in the areas to be paved including the density control strip.

END OF SECTION

## SECTION 02751 - CONCRETE PAVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Preparation and placement of Portland cement concrete parking areas.
  - 2. Preparation and placement of Portland cement concrete roads and entrances.
  - 3. Aggregate base below slab.
- B. Related Requirements:
  - 1. Section 01330 - Submittal Procedures:
  - 2. Section 02300 - Earthwork: Excavation, backfill, compaction for subgrades.
  - 3. Section 02765 - Pavement Markings.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Concrete Institute (ACI):
  - 1. ACI 117 - Tolerances for Concrete Construction and Materials and Commentary.
  - 2. ACI 301 - Structural Concrete.
  - 3. ACI 305.1- Hot Weather Concreting.
  - 4. ACI 306.1- Cold Weather Concreting.
  - 5. ACI 308.1 - Curing Concrete.
  - 6. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary.
- C. American Society for Testing and Materials (ASTM):
  - 1. ASTM A 36 - Structural Steel.
  - 2. ASTM A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  - 3. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
  - 4. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.
  - 5. ASTM C33 - Concrete Aggregates.
  - 6. ASTM C 39 - Compressive Strength of Cylindrical Concrete Specimens.
  - 7. ASTM C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  - 8. ASTM C94 - Ready-Mixed Concrete.
  - 9. ASTM C138 - Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
  - 10. ASTM C143 - Slump of Hydraulic Cement Concrete.
  - 11. ASTM C150 - Portland Cement.
  - 12. ASTM C172 - Sampling Freshly Mixed Concrete.
  - 13. ASTM C231 - Air-Content of Freshly Mixed Concrete by the Pressure Method.
  - 14. ASTM C260 - Air-Entraining Admixtures for Concrete.
  - 15. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
  - 16. ASTM C403 - Time of Setting of Concrete Mixtures by Penetration Resistance
  - 17. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.
  - 18. ASTM C920 - Elastomeric Joint Sealants.
  - 19. ASTM C989 - Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
  - 20. ASTM C1064 - Temperature of Freshly Mixed Portland Concrete Cement.
  - 21. ASTM C1218 - Water-Soluble Chloride in Mortar and Concrete.
  - 22. ASTM C1602 - Mixing Water used in the Production of Hydraulic Cement Concrete.
  - 23. ASTM D98 - Calcium Chloride
  - 24. ASTM D 698 - Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 Kg) Hammer and 12-in (305 mm) Drop.
  - 25. ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous).
  - 26. ASTM D1241 - Materials for Soil-Aggregate Subbase, Base and Surface Courses

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27. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
28. ASTM D1752: Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
29. ASTM D2628 - Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.
30. ASTM D3575: Standard Test Methods for Flexible Cellular Materials Made From Olefin Polymers.

D. Federal Specifications (FS):

1. FS HH-F-341 - Fillers, Expansion Joint: Bituminous (Asphalt & Tar)

E. International Code Council, Inc.:

1. International Building Code (IBC).

F. Oklahoma Department of Transportation (ODOT):

1. Standard Specifications for Highway Construction, 2019 Edition.

G. National Ready-Mixed Concrete Association:

1. NRMCA Inspection Standards

### 1.3 SUBMITTALS

- A. Obtain Engineer's approval for Mix Design and Pavement Joint and Placement Plan prior to commencement of work.

- B. Submit submittal items required within this section in a single submittal.

- C. Sieve Analysis for Aggregate Base: Submit current sieve analysis report, sampled and tested within the last 60 days of submittal date, for aggregate base and choker material.

- D. Concrete Batch Plant Certifications: Submit name and address of the concrete supplier's batch plant and plant certification(s) by National Ready-Mix Concrete Association and/or State Department of Transportation.

E. Mix Design:

1. Fill out and submit attached Concrete Mix Design Submittal Form.
2. Submit three copies of each proposed mix.
3. Submit separate mix design for concrete to be placed by pumping in addition to the mix design for concrete to be placed directly from the truck chute.
4. Submit mix design to the Civil Engineering Consultant of Record and the Owner's Construction Testing Laboratory.
5. Include applicable information shown on the Mix Design Submittal Form and the following:
  - a. Proportions of cementitious materials, fine and coarse aggregate, and water.
  - b. Water-cementitious material ratio, 28-day compressive design strength, slump, and air content.
  - c. Type of cement, fly ash, slag and aggregate.
  - d. Aggregate gradation.
  - e. Type and dosage of admixtures.
  - f. Special requirements for pumping.
  - g. Range of ambient temperature and humidity for which design is valid.
  - h. Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.
6. Materials and methods for curing concrete.

- F. Attachments to Concrete Mix Design: Submit the following as attachments to be included with the Concrete Mix Design:

1. Cementitious materials mill test reports for the following:
  - a. Portland cement
  - b. Fly ash
  - c. Slag
2. Designation, type, quality, and source (natural or manufactured) of coarse and fine aggregate materials.

3. Sieve Analysis Reports: Provide separate sieve analysis of percentages passing for coarse and fine aggregate. Show values for each sieve size shown on the mix design form. Do not leave any line blank. Sieve analysis sampling and testing for each aggregate source shall be conducted within 60 days of concrete submittal date.
  4. Aggregate Supplier Statement:
    - a. Stating if aggregate is possibly alkali-reactive based on tests or past service.
    - b. Stating if aggregate can possibly cause pop-outs, "D" cracking, or other disruptions due to moisture gain, freezing, or other mechanisms, based on tests or past service.
  5. Product data for the following concrete materials admixtures:
    - a. Water reducing
    - b. Set retarding
    - c. Set accelerating
    - d. Data indicating chloride ion content information for each admixture
  6. Concrete compressive strength data as required by ACI 318.
  7. Concrete supplier approval of mix design.
  8. Chloride-Ion Content: Measured water-soluble chloride-ion content (percent by weight of cementitious materials) in accordance with ASTM C1218.
  9. Time of Initial Setting: Initial setting time in accordance with ASTM C403.
- G. Product Data: Submit certified laboratory test data or manufacturer's certificates and data for the items listed below certifying that materials are in conformance requirements specified herein. Submit to the Civil Engineering Consultant of Record and the Construction Testing Laboratory for review and approval and within 7 calendar days after receipt of Notice-to-Proceed.
1. Portland cement concrete mix design(s)
  2. Type and source of Portland cement, fly ash, and slag
  3. Aggregate gradations
  4. Joint back-up material
  5. Soft preformed joint filler
  6. Pavement joint sealant
  7. Dowel bars
  8. Tie bars
  9. Reinforcing steel bars
  10. Welded wire fabric
  11. Air entraining admixtures
  12. Water-reducing, set-retarding, and set-accelerating admixtures (if used)
- H. Pavement Joint and Placement Plan: For projects with all-concrete parking lots, provide a placement plan identifying the items listed below.
1. Concrete truck access location.
  2. Extent of placements including width, length, slab placement area and volume.
  3. Locations of construction joints.
  4. Location of sawn contraction joints if different from those shown on the civil drawings.
- I. Pre-Slab Installation Meeting:
1. Provide record of notification of pre-slab meeting including company name, persons contacted, and date and method of contact.
  2. Provide meeting minutes to all participants.
- J. Delivery Tickets:
1. Copies of delivery tickets for each load of concrete delivered to site.
  2. Indicate information required by ASTM C 94 on each ticket including additional information required for slabs.
  3. Information on ticket shall include quantities of material batched including the amount of free water in the aggregate and the quantity of water that can be added at the site without exceeding the maximum water cementitious ratio of the approved mix design. Aggregate moisture corrections shall be based on ASTM definitions of aggregate moisture content and absorption.
  4. Mix identification number on ticket shall match number on submitted and approved mix design.
  5. Submit copies to Owner's Testing Laboratory with each concrete delivery.

- K. Installation Certification: Submit certification in writing that final placement is in accordance with specification requirements.
- L. Statement of Approval of Concrete Supplier: Submit statement with information specified in Quality Assurance paragraph below.

#### 1.4 QUALITY ASSURANCE

- A. Concrete Truck Inspection:
  - 1. Conform to ASTM C94, NRMCA, and Department of Transportation standards in state where project is located.
  - 2. Perform inspections immediately before starting concreting operations.
  - 3. Record acceptable truck numbers.
  - 4. Record the identification numbers of those trucks found to be acceptable on the basis of inspections.
  - 5. Do not bring on site for concreting operations, any truck whose identification numbers are not recorded as acceptable. Notify Owner's Testing Lab if non-conforming trucks are used to deliver concrete for slabs and pavements.
- B. Tolerances:
  - 1. Conform to most stringent requirements of ACI 117 and ACI 301 except as specified herein.
  - 2. Thickness Tolerance- The concrete pavement thickness shall meet or exceed the design thickness. All sections not meeting the minimum design thickness (0" minus tolerance) will be unacceptable and shall be removed and replaced at no additional cost to the Owner.
  - 3. Compressive Strength – The specified concrete pavement compressive strength is a minimum requirement. All paving not meeting the minimum compressive strength requirements will be unacceptable and shall be removed and replaced at no additional cost to the Owner.
- C. Concrete Supplier Approval:
  - 1. The concrete supplier shall be fully approved and acceptable by the concrete subcontractor as the producer of concrete for which the subcontractor is to place and finish. Prepare Statement of Approval of Concrete Supplier stating project name, name of concrete supplier, along with the statement of approval and the signatures of the Contractor and concrete pavement subcontractor.
- D. Pre-installation Meeting: Convene a pre-installation meeting at the site at least two weeks prior to commencing work of this Section. Require attendance of parties directly affecting work of this Section, including, but not limited to, the Owner's representative, CTL's representative and inspector, Contractor, concrete sub-contractor and job foreman, concrete supplier, and base fine grading contractor.
  - 1. Contact Owner Thirty days prior to pre-installation conference to confirm schedule.
  - 2. Record discussions of meeting and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to paving work, including the following:
    - 3. CTL's testing and inspection procedures.
    - 4. Concrete finishes and finishing.
    - 5. Cold- and hot-weather concreting procedures.
    - 6. Curing procedures.
    - 7. Concrete design mixture and examine procedures for ensuring quality of concrete materials.
    - 8. Proposed sources of concrete materials, including capabilities and location of plant that will manufacture concrete.
    - 9. Tour, inspect and discuss condition of subgrade, drainage structures, and other preparatory work.
    - 10. Requirements for protecting concrete work, including restriction of traffic during installation period and for remainder of construction period.
    - 11. Review and finalize construction schedule and verify availability of materials.
    - 12. Concrete paving requirements (drawings, specifications and other contract documents).
    - 13. Required submittals, both completed and yet to be completed.
    - 14. Weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
    - 15. Safety precautions relating to placement of concrete.
    - 16. Changes to the contract documents from recommendations or discussions at the Pre-Construction meeting shall be approved in writing by the Owner prior to implementation.

## 1.5 ENVIRONMENTAL REQUIREMENTS

### A. Concreting in Hot, Dry, or Windy Weather:

1. Employ precautions to avoid cracking when the concrete rate of evaporation exceeds 0.1 pounds per square foot per hour or when any combination of concrete materials and weather conditions are favorable for the formation of plastic shrinkage cracks.
2. Maintain an accurate reading thermometer at the job site to check temperature of concrete.
3. Reject concrete if more than one slump adjustment, as defined in ASTM C 94, is required.
4. Do not place concrete when forms, subgrade, aggregate base, or reinforcing bars are more than 120 F or the temperature differential between the forms, aggregate base, or reinforcing bars and concrete will create conditions favorable for settlement cracks or thermal cracking.

### B. Concreting in Cold Weather:

1. Conform to ACI 306.1 when temperature and other environmental conditions are as noted therein.
2. Subgrade shall be thawed to depth of 12 inches immediately before placing concrete.
3. Measure and record concrete temperature during protection period in each placement at regular time intervals, but not less than 3 times per 24 hour period.
4. Do not place slabs on subgrade or base that is more than 20°F cooler than concrete. Warm subgrade or base to decrease temperature differential to 20 F or less

## 1.6 PROJECT CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic as required for other construction. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with nonstaining type of coating that will not discolor or deface surface of concrete.

### B. Aggregate Base and Choker Materials:

1. Aggregate Base Material:
  - a. Gradation: Conform to gradation shown on the Civil Drawings.
2. Aggregate Choker Material: Clean granular fill with less than 3% clay and/or friable particles. Use one of the following gradations:
  - a. ASTM 448 No. 10 with 6% to 12% passing No. 200 sieve.
  - b. Material meeting the following gradation:

<u>Std. Sieve Size</u>	<u>% Passing</u>
No. 4	85-100
No. 8	75-95
No. 16	55-75
No. 50	22-45
No. 100	10-30
No. 200	6-12

### C. Reinforcement:

1. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A185. Furnish in flat sheets.
2. Reinforcing Bars: Deformed steel bars, ASTM A615, Grade 60.
3. Joint Dowel Bars: ASTM A615, grade 40 minimum, smooth round plain steel bars, or ASTM A36, smooth round or square plain steel bars, cut bars true to length with ends square and free of burrs.

### D. Cementitious Materials:

1. Portland Cement: ASTM C150, Type I, Use only one brand throughout project.  
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2. Fly Ash: ASTM C 618, Class C or F. Use only one type and source throughout project.
  3. Slag: ASTM C989, Grade 100 or 120. Use only one type and source throughout project.
- E. Pavement Joint Materials:
1. Joint Back-up Material: Polyethylene foam, 100% closed cell
  2. Soft Preformed Joint Filler: Flexible closed-cell non-extruding synthetic foam expansion joint strips.
    - a. Ceramar Flexibe Foam Expansion Joint, by W.R. Meadows.
    - b. Deck-O-Foam Expansion Joint Filler, by W.R. Meadows
  3. Sealant:
    - a. Dow 888, by Dow Corning.
    - b. 301 NS by Pecora.
    - c. Spectrum 800 by Tremco.
- F. Concrete Aggregate:
1. Conform to ASTM C33.
  2. Aggregate shall contain no coal or lignite in concrete that will not be covered by soil.
  3. Fine Aggregate:
    - a. Conform to fine aggregate grading requirements as defined in section 6.1 of ASTM C 33 unless approved by the Civil Engineer.
    - b. If manufactured sand is used, blend with minimum 25% natural sand unless otherwise approved by Civil Engineer.
  4. Coarse Aggregate:
    - a. Nominal maximum coarse aggregate size shall be 1 inch for slabs  $\leq$  5-1/2 inch thick.
    - b. The nominal maximum size of an aggregate is the smallest sieve size through which the major portion of the aggregate must pass, with a minimal amount retained on the maximum sieve size. Maximum 4% shall be retained on the nominal maximum size sieve.
  5. Adjust proportions of combined coarse, intermediate, and fine aggregates to provide the following particle size distribution characteristics, unless otherwise approved:
    - a. Coarseness Factor of 60 to 75%.
      - 1) The Coarseness Factor (CF) is the percent of combined aggregate retained on the #8 sieve that is also retained on the 3/8" sieve.
      - 2) The Coarseness Factor is calculated as follows:
        - a)  $CF = \text{Aggregate retained on } 3/8" \text{ sieve} / \text{Aggregate retained on } \#8 \text{ sieve.}$
    - b. Adjusted Workability Factor
      - 1) The Workability Factor (WF) is the percent of combined aggregate that passes the #8 sieve.
      - 2) The Adjusted Workability Factor (Adj-WF) is calculated as follows:
        - a)  $\text{Adj-WF} = WF + [(\text{Cementitious Material} - 564 \text{ lbs.}) / 37.6]$
      - 3) The range of accepted Adj-WF for a given CF is as follows:
        - a)  $\text{Adj-WF} = [(11.25 - .15 CF) + 33] \pm 2.5$
      - 4) Combined percent retained on any given sieve size shall not exceed 24%.
    - c. Gradation requirement of ASTM C33 may be waived in order to meet ranges specified.
- G. Water: ASTM C 1602.
- H. Air Entrainment: ASTM C260.
1. Air-Mix or AEA-92, by Euclid.
  2. MasterAir VR 10, MasterAir AE 90, or MasterAir E 200 by BASF Admixtures.
  3. Daravair or Darex Series, by W.R. Grace.
  4. Equivalent approved products.
- I. Evaporation Retardant: Water-based polymer, sprayable.
1. Euco-Bar, by Euclid
  2. MasterKure ER 50 by BASF Admixtures
  3. Aquafilm, by Dayton Superior.
- J. Liquid Membrane Curing and Sealing Compound: ASTM C 1315, Type I, Class A or B, 25% minimum solids content, clear non-yellowing with no styrene-butadiene.
1. Water Based, VOC less than 350 g/l:
    - a. Super Aqua Cure, by Euclid Chemical Corp.

b. MasterKure CC 1315WB by BASF Admixtures.

K. Dissipating Curing Compound (For use below 40F): ASTM C 309 Type 1, Class A or B.

1. Solvent base, VOC less than 350 g/l: Cetri Vex EnvioCure 100 by Vexcon.

## 2.2 CONCRETE MIX

A. Design mix shall produce normal weight concrete consisting of Portland cement, supplementary cementitious materials, aggregates, admixtures, and water to produce specified requirements.

B. Geographical Weather Exposure Classification: Geographical exposure classification shall be Moderate F2 exposure.

C. Concrete Site Pavement

1. ACI Exposure Category and classification:

a. Moderate exposure: F2

2. Compressive Strength: Strength at 28 days, unless otherwise indicated on the Drawings:

a. Moderate and severe exposure classification: 4,000 psi.

3. Maximum Water-Cementitious Material Ratio (Cement Quantity Includes Fly Ash or slag):

a. Moderate and severe exposure classification: 0.45 by wt.

4. Slump Range: Slump at the point of placement shall be 2 to 4 inches for hand placed concrete, 1-1/4 to 3 inches for machine placed (slip form) concrete. Maximum slump variance shall be 2 inches.

5. Air Content: As shown in the table below.

D. Air Entrainment as shown below:

Nominal Maximum Size Aggregate (Inch)	Average Air Content (%) +/- 1.5% By Exposure Category	
	Negligible - F0	Moderate or Severe – F2 & F3
3/8	4.5	7.5
1/2	4.0	7.0
3/4	3.5	6.0
1	3.0	6.0
1-1/2	2.5	5.5

E. Supplementary Cementitious Materials (SCM):

1. Concrete mix shall contain SCM at the amounts specified unless other amounts are approved by the Civil Engineer. Either fly ash or ground granulated blast furnace slag (GGBFS) may be used for the SCM but shall not be used together to form a ternary mix. Use of fly ash or GGBFS in the concrete mix is mandatory.

2. Fly Ash: Substitute fly ash for Portland cement at 20% of the total cementitious content.

a. If used to mitigate potential aggregate reactivity, up to 30% fly ash substitution of Portland cement is allowed. Only Type F fly ash may be used and shall have the following maximum properties: 1.5% available alkali and 8.0% CaO. When a maximum of 30% replacement is used, up to 10.0% CaO is permitted.

3. Ground Granulated Blast Furnace Slag (GGBFS): Substitute GGBFS for Portland cement at 25% of the total cementitious content.

a. If required to mitigate potential sulfate exposure or aggregate reactivity, up to 50% GGBFS substitution of Portland cement is allowed.

4. Maintain air-entrainment at specified levels.

F. Calcium Chloride:

1. Calcium chloride (Type L) may be used in solution form as part of the mixing water to accelerate concrete setting and early-strength development.

2. Amount of calcium chloride added shall not be more than necessary to produce the desired results and shall not exceed 2% by weight of cement.
3. The dosage range for the calcium chloride for the entire project shall not vary by more than 1%. Range is defined as the difference between the maximum and minimum dosages of calcium chloride for the entire project.
4. Calcium chloride shall not be used in the following applications unless approved by the Civil Engineer:
  - a. concrete containing embedded dissimilar metals or aluminum
  - b. slabs supported on permanent galvanized steel forms
  - c. concrete exposed to deicing chemicals
  - d. prestressed or post-tension concrete
  - e. concrete containing aggregates with potentially deleterious reactivity and concrete exposed to soil
  - f. concrete exposed to soil or water containing sulfates.
5. Use calcium chloride in accordance with manufacturer's recommendation.
6. Chloride-ion Concentration: Maximum water-soluble chloride-ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed the following limits unless approved by the Civil Engineer:
 

Type of Member	Maximum water-soluble chloride ion (Cl-) content in concrete (percent by weight of cement)
Prestressed concrete	0.06
Reinforced concrete exposed to chloride in service	0.15
Reinforced concrete that will be dry or protected from moisture in service	1.00
Other reinforced concrete construction	0.30
7. When using calcium chloride or other admixtures containing chlorides, measure water-soluble chloride-ion content (percent by weight of cement) per ASTM C 1218. Sample shall be from concrete representing the submitted mix design and maximum chloride dosage anticipated for the project.

## 2.3 MIXING

- A. Mix concrete and deliver in accordance with ASTM C 94.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Proofroll prepared base material surface to check for unstable areas in accordance with Section 02300 including documentation and re-proof rolling as required. Paving work shall begin only after unsuitable areas have been corrected and are ready to receive paving.
- B. Remove loose material from compacted base material surface to produce firm, smooth surface immediately before placing concrete.

### 3.2 AGGREGATE BASE PLACEMENT

- A. Unless otherwise specified on the Drawings, place aggregate base as specified herein.
- B. Aggregate Base:
  1. Install aggregate base where shown on Drawings.
  2. Compact to final thickness shown in layers not exceeding 6 inches with minimum of 2 passes per layer with vibratory compactor.
  3. Compact fill to 95 percent of optimum density, as determined by ASTM D698.
  4. Leave base up to 2 inches low until just prior to concrete placement.
- C. Aggregate Base Fine Grading:
  1. Compact to final thickness shown with 2 passes minimum vibratory compactor to produce smooth, flat, dense surface.
  2. Do not allow excess moisture in or on base at time of placing concrete.

3. Level off aggregate base top surface with a maximum 3/4" thick aggregate choker material to achieve the following:
    - a. To reduce surface friction and to meet specified fine grade tolerances specified below.
    - b. To level areas exposed to rain, traffic, or excavations for buried utilities.
    - c. At areas where aggregate base material does not have sufficient fine particles to produce a surface that is free of exposed aggregate or surface voids greater than 3/8" in size at time of slab installation.
  4. Owner's Construction Testing Laboratory shall verify adequate fines at surface immediately prior to concrete slab placement.
  5. Provide dry, smooth, flat, dense surface
  6. Proof-roll 48 hrs. maximum prior to concrete placement. Depression under a fully loaded ready mix truck shall not exceed 1/2 inch.
- D. Pavement Aggregate Base Fine Grade Tolerance: +0 inch, -3/4 inch with transition no greater than 3/4 inch vertically to 8 inches horizontally.

### 3.3 INSTALLATION

- A. Form Construction
1. Set forms to required grades and lines, rigidly braced and secured.
  2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place minimum of 24 hours after concrete placement.
  3. Check completed formwork for grade and alignment to following tolerances:
    - a. Top of forms not more than 1/8-inch in 10'-0".
    - b. Vertical face on longitudinal axis, not more than 1/4-inch in 10'-0".
  4. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.
- B. Reinforcement: Fasten reinforcing bars or welded wire fabric (if required) accurately and securely in place with suitable supports and ties. Remove from reinforcement all dirt, oil, loose mill scale, rust, and other substances that will prevent proper bonding of the concrete to the reinforcement.
- C. Concrete Placement
1. Mix and place concrete when the air temperature in the shade and away from artificial heat is a minimum of 35 degrees F and rising. Hot and cold weather concreting shall be in accordance with ACI 305.1 (hot weather) and 306.1 (cold weather).
  2. Do not place concrete until base material and forms have been checked for alignment and grade. Concrete shall not be placed around manholes or other structures until they are at required finish elevation and alignment.
  3. Place concrete using methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
  4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place construction joint.
- D. Contraction and Construction Joints: Construct contraction and construction joints straight with face perpendicular to concrete surface. Construct transverse joints perpendicular to centerline, unless otherwise detailed.
1. Contraction Joints: Provide joints at spacing of 12'-0" on centers, maximum each way. Construct control joints for depth equal to at least 1/4 of the concrete thickness, as follows:
    - a. Form tooled joints in fresh concrete by grooving top with recommended tool and finishing edge with jointer.
    - b. Sawed Contraction Joints:
      - 1) Use saws, blades, skid plates, and accessories by Soff-Cut International, Inc. or approved equal.
      - 2) Start cutting sawed joints as soon as concrete has hardened sufficiently to prevent raveling or dislodging of aggregates. This will typically be from 1 hour in hot weather to 4 hours in cold weather after completing finishing of slab in that joint location.
      - 3) Provide at least two "Soff-Cut" saws on site with blades capable of achieving the required depth of saw cut.

- 4) Extend sawed joint to the slab boundaries and abutments, including columns, drains, and other penetrations in the path of a defined joint. Implement methods and timing of the saw cut beyond the limits of the Soff-Cut saw reach to provide a consistent depth of cut with minimal raveling of joint edges.
2. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for period of more than 1/2 hour. Construct joints in accordance with details shown.
- E. Isolation and Fixed Object Joints: Construct joint at locations and in accordance with details shown.
- F. Pavement Joint Materials: Place joint fillers, back-up material, and sealants at locations shown and in accordance with manufacturer's instructions.
  1. Soft Preformed Joint Fillers: Extend preformed joint fillers full-width and depth of joint, and not less than 1/2-inch or more than 1-inch below finished surface. Furnish preformed joint fillers in 1-piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip preformed joint filler sections together in a single plane.

### 3.4 CONCRETE FINISHING

- A. After initial striking off and consolidating of concrete paving, smooth surface using either a magnesium channel float or magnesium bull float.
- B. Round edges of slabs and formed joints to 1/2-inch radius with edging tool. Eliminate tool marks on concrete surface.
- C. After completion of straightedge / floating and when excess moisture or surface sheen has disappeared, uniformly finish surface to provide a coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to flow of traffic so as to produce regular corrugations not over 1/16 of an inch deep. Initial nonslip finishing shall be approved by the Owner.
- D. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Owner.

### 3.5 CURING AND PROTECTION

- A. Protect and cure finished concrete paving using curing compound. Cure for a period not less than 7 days.
- B. Use solvent based curing compound when compound is applied below 40 F.

### 3.6 CLEANING AND ADJUSTING

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

### 3.7 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor in accordance with Section 01452. Field quality control testing and inspection shall be at the discretion of the Contractor as necessary to assure compliance with Contract requirements. Owner T&I shall not be considered a substitute for the Contractor's responsibility to perform similar routine, necessary, and customary testing and inspection of the methods and frequency suitable for the type of work involved.
- B. Responsibilities and Duties Relative to Owner Testing and Inspection:
  1. Notify Owner's CTL in advance of concrete placements to allow sufficient time to prepare for a site visit.

2. Assist Owner's agency in securing field specimens.
  3. Provide and maintain for sole use of CTL, facilities for safe storage and proper curing of concrete test cylinders at project site as required by ASTM C31 and acceptable to Owner's Testing Laboratory.
- C. Correction of Deficient Work:
1. When directed by the Owner, remove and replace or repair concrete and related Work which does not conform to specified requirements including strength, tolerances, and finishes.
  2. Bear cost of corrections or delays to other work affected by, or resulting from, corrections to concrete Work.
  3. If results of compressive strength tests reveal deficiencies in concrete, meet requirements of ACI 318 and ACI 301.

END OF SECTION

CONCRETE MIX DESIGN SUBMITTAL FORM  
(Section 02751 – Concrete Pavement)

Date

SITE INFORMATION

ADDRESS \_\_\_\_\_  
CITY, ST \_\_\_\_\_  
GENERAL CONTRACTOR \_\_\_\_\_  
COMPANY \_\_\_\_\_  
JOBSITE PHONE \_\_\_\_\_

A. CONCRETE INFORMATION

Supplier Mix Design #	_____
Design Strength (f'c)	_____ psi
Water / Cementitious Ratio	_____
Total Air Content	_____ %
Total Est. Volume of Concrete	_____ CY
Mix Developed From:	
<input type="checkbox"/> Trial Mix Test Data ( <i>attach test data</i> )	
<input type="checkbox"/> Field Experience	
Density	
Wet _____ pcf	Dry _____ pcf
Slump	
“ _____ ( ± 1” ) <b>WITHOUT</b> WR Admixture	
“ _____ ( ± 1” ) <b>WITH</b> WR Admixture	

LEAVE BLANK FOR STAMP OF APPROVAL BY  
CONCRETE SUPPLIER AND ENGINEER OF RECORD

B. ADMIXTURE INFORMATION

	ASTM Designation	Product (Manufacturer/Brand)	Dosage (ounces)	
			oz / cy	oz / cwt
Water Reducing				
Accelerating				
Retarding				
Air-Entraining				

C. MIX DESIGN

Mix Proportions (per cubic yard)

	Identification (Type, size, source, etc.)	Weight (pounds)	Density (SSD)	Volume (cubic feet)	% Aggregate Absorption
Cement					

Fly Ash					
Slag					
Coarse Aggregate #1					
#2					
#3					
Fine Aggregate #1					
#2					
Water					
Air Content					
	TOTALS				

Coarse & Fine Aggregate Gradation Information

Sieve Size	% Passing Each Sieve (All Sieve Sizes must be entered)					Combined % Passing	Combined % Retained	
	Coarse Agg. # 1	Coarse Agg. # 2	Coarse Agg. # 3	Fine Agg. # 1	Fine Agg. # 2		Cumulative	Individual
% of Vol								

Aggregate Ratios

Coarseness Factor =	$\frac{\text{Combined \% cumulative retained } 3/8'' \text{ sieve}}{\text{Combined \% cumulative retained } \#8 \text{ sieve}} =$	
Workability Factor =	Combined % passing #8 sieve =	
Adj-Workability Factor =	$\text{WF} + [(\text{Cementitious Material} - 564) \div 37.6] =$	
Allowable Adj-WF=	$\text{Adj-WF} = [(11.25 - .15 \text{ CF}) + 33] \pm 2.5 = \quad \text{Low} \quad \text{High}$	

**D. ATTACHMENTS:** Include the following with this Mix Design Report.

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- ☐ Portland Cement mill test reports
- ☐ Fly ash mill test reports
- ☐ Slag mill test reports
- ☐ Designation, type, quality, and source (natural or manufactured) of coarse and fine aggregate materials
- ☐ Separate aggregate gradation reports including all required sieve sizes
  - All gradation sieve report tests dated within 60 days of this report
  - Report for each coarse and fine aggregate material in mix
- ☐ Statement if possible reactivity of aggregate, based on tests or past service
- ☐ Statement if possible aggregate pop-outs or their disruptions, based on tests or past service
- ☐ Product data for the following admixtures:
  - Chloride ion data and related calculations
  - Water reducing, set retarding, set accelerating, etc.
- ☐ Measured water-soluble chloride ion content in concrete (percent by weight of cement).
- ☐ Concrete compressive strength data used for standard deviation calculations

**E. CONCRETE SUPPLIER INFORMATION**

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Company Name	_____	Tel. #	(     )
Address	_____		
City, ST Zip	_____		
Technical Contact	_____	Cell #	(     )
		e-mail	_____
Sales Contact	_____	Cell #	(     )

	<u>PRIMARY PLANT</u>	<u>SECONDARY PLANT</u>
Plant Location:	_____	_____
Miles from Site:	_____	_____
Travel Time to Site:	_____	_____
NRMCA Certified:	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
State DOT Certified:	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
Batch Mixing Type:	<input type="checkbox"/> DRY <input type="checkbox"/> CENTRAL MIX	<input type="checkbox"/> DRY <input type="checkbox"/> CENTRAL MIX

## SECTION 02765 - PAVEMENT MARKINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Painting and marking of pavements, curbs, guard posts, and light pole bases.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Association of State Highway and Transportation (AASHTO):
  - 1. AASHTO M247 - Glass Beads Used in Traffic Paints
  - 2. AASHTO M248 - Ready-Mixed White and Yellow Traffic Paints
- C. Master Painter's Institute (MPI):
  - 1. MPI 32 – Traffic Marking Paint, Solvent Based.
  - 2. MPI 97 – Traffic Marking Paint, Latex.
- D. ASTM International (ASTM):
  - 1. ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness by Notched Gauges.
- E. Federal Specifications (FS):
  - 1. FS A-A-2886 - Paint, Traffic, Solvent Based (supersedes FS TT-P-85 and FS TT-P-115, Type I)
  - 2. FS TT-P-1952 - Paint, Traffic And Airfield Marking, Waterborne

#### 1.3 PROJECT CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs, and warning lights as required.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Paint shall be waterborne or solvent borne, colors as shown or specified herein. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.
- B. Waterborne Paint: Paints shall conform to FS TT-P-1952 and have MPI 97 approval.
- C. Solvent Borne Paint: Paint shall conform to FS A-A-2886 or AASHTO M248 and have MPI 32 approval. Paint shall be non-bleeding, quick-drying, and alkyd petroleum base paint suitable for traffic-bearing surface and be mixed in accordance with manufacturer's instructions before application for colors White, Yellow, Blue, and Red.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine the work area and correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

#### 3.2 PREPARATION

02765-1

- A. Sweep and clean surface to eliminate loose material and dust.
- B. Where existing pavement markings are indicated on Construction Drawings to be removed or would interfere with adhesion of new paint, a motorized abrasive device shall be used to remove the markings. Equipment employed shall not damage existing paving or create surfaces hazardous to vehicle or pedestrian traffic. Within public rights-of-way, appropriate governing authority shall approve method of marking removal.
- C. New pavement surfaces shall be allowed to cure for not less than 30 days before application of marking materials.

### 3.3 CLEANING EXISTING PAVEMENT MARKINGS

- A. Remove existing pavement markings which are in good condition but interfere or conflict with the newly applied marking patterns. Deteriorated or obscured markings that are not misleading or confusing or do not interfere with the adhesion of the new marking material do not require removal. Conduct grinding, scraping, sandblasting or other operations in such a manner that the finished pavement surface is not damaged or left in a pattern that is misleading or confusing. Use dust collection system when pavement preparation includes grinding, scraping or sandblasting of existing pavement markings.

### 3.4 APPLICATION

- A. Apply two coats of same color of paint as specified below, at manufacturer's recommended rate, without addition of thinner, with maximum of 100 square feet per gallon or as required to provide a minimum wet film thickness of 15 mils and dry film thickness of 7 ½ mils per coat. Paint shall be applied for a total dry film thickness of 15 mils. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use straightedge to ensure uniform, clean, and straight stripe.
- B. Install pavement markings according to manufacturer's recommended procedures for the specified material.
- C. Following items shall be painted with colors noted below:
  - 1. Pedestrian Crosswalks: White
  - 2. Exterior Sidewalk Curbs and Guard posts: Yellow
  - 3. Exterior Light Pole Bases: Yellow (unless otherwise noted on Construction Detail).
  - 4. Fire Lanes: Red or per local code.
  - 5. Lane Striping where separating traffic moving in opposite directions: Yellow.
  - 6. Lane Striping where separating traffic moving in the same direction: White.
  - 7. ADA Symbols: Blue or per local code.
  - 8. ADA parking space markings as shown on the drawings.
  - 9. Parking Stall Striping: White, unless otherwise noted on Construction Drawings.

### 3.5 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor as necessary to assure compliance with Contract requirements.

### 3.6 CLEANING

- A. Waste materials shall be removed at the end of each workday. Upon completion of the work, all containers and debris shall be removed from the site. Paint spots upon adjacent surfaces shall be carefully removed by approved procedures that will not damage the surfaces and the entire job left clean and acceptable.

END OF SECTION

## SECTION 02770 - CURBS AND SIDEWALKS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Portland cement concrete curbs, gutters, and sidewalks except sidewalks adjacent to building.
- B. Related Requirements:
  - 1. Section 02300 - Earthwork: Preparation of subgrades.
  - 2. Section 03310 - Structural Concrete and Exterior Concrete Slabs: Exterior sidewalks adjacent to building.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Concrete Institute (ACI):
  - 1. ACI 305R - Hot Weather Concreting
  - 2. ACI 306R - Cold Weather Concreting
  - 3. ACI 306.1 - -- Standard Specifications for Cold Weather Concreting.
  - 4. ACI 308 - -- Standard Specifications for Curing Concrete
- C. ASTM International (ASTM):
  - 1. ASTM A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  - 2. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
  - 3. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.
  - 4. ASTM C39 - Comprehensive Strength of Cylindrical Concrete Specimens.
  - 5. ASTM C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  - 6. ASTM C94 - Ready-Mixed Concrete.
  - 7. ASTM C138 - Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
  - 8. ASTM C143 - Slump of Hydraulic Cement Concrete.
  - 9. ASTM C231 - Air-Content of Freshly Mixed Concrete by the Pressure Method.
  - 10. ASTM C172 - Sampling Freshly Mixed Concrete.
  - 11. ASTM C173 - Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
  - 12. ASTM C260 - Air-Entraining Admixtures for Concrete.
  - 13. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
  - 14. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.
  - 15. ASTM C989 - Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
  - 16. ASTM C1064 - Temperature of Freshly Mixed Portland Concrete Cement.
  - 17. ASTM C1218 - Water-Soluble Chloride in Mortar and Concrete.
  - 18. ASTM D98 - Calcium Chloride.
  - 19. ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous).
  - 20. ASTM D1190 - Concrete Joint Sealer, Hot Poured, Elastic Type.
  - 21. ASTM D1751 - Performed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  - 22. ASTM D2628 - Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.
- D. Federal Specifications (FS):
  - 1. FS HH-F-341 - Fillers, Expansion Joint: Bituminous (Asphalt & Tar)
- E. Oklahoma Department of Transportation (ODOT):
  - 1. Standard Specifications for Highway Construction, 2019 Edition.

### 1.3 SUBMITTALS

- A. Mix Design:
1. Fill out and submit attached Concrete Mix Design Submittal Form.
  2. Submit three copies of each proposed mix.
  3. Submit separate mix design for concrete to be placed by pumping in addition to the mix design for concrete to be placed directly from the truck chute.
  4. Submit mix design to the Civil Engineering Consultant of Record and the Owner's Construction Testing Laboratory.
  5. Include applicable information shown on the Mix Design Submittal Form and the following:
    - a. Proportions of cementitious materials, fine and coarse aggregate, and water.
    - b. Water-cementitious material ratio, 28-day compressive design strength, slump, and air content.
    - c. Type of cement, fly ash, slag and aggregate.
    - d. Aggregate gradation.
    - e. Type and dosage of admixtures.
    - f. Special requirements for pumping.
    - g. Range of ambient temperature and humidity for which design is valid.
    - h. Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.
    - i. Materials and methods for curing concrete.
- B. Submit certified laboratory test data or manufacturer's certificates and data for the items listed below certifying that materials are in conformance requirements specified herein. Submit to the Engineering Consultant of Record and the Construction Testing Laboratory for review and approval and within 7 calendar days after receipt of Notice-to-Proceed.
1. Concrete mix design(s)
  2. Type and source of Portland cement, fly ash, and slag
  3. Aggregate gradations
  4. Preformed expansion joint filler
  5. Field molded/poured sealant
  6. Dowel bars
  7. Expansion sleeves
  8. Tie bars
  9. Reinforcing steel bars
  10. Welded wire fabric
  11. Air entraining admixtures
  12. Water-reducing, set-retarding and set-accelerating admixtures (if used)
- C. Test Reports: Submit field quality control test reports.

### 1.4 PROJECT CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Forms shall be of depth equal to depth of curbing or sidewalk, and so designed as to permit secure fastening together at tops. Coat forms with nonstaining type of coating that will not discolor or deface surface of concrete.
- B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A185. Furnish in flat sheets.
- C. Reinforcing Steel: Deformed steel bars, ASTM A615, Grade 60.

- D. Portland Cement: Shall conform to ASTM C150, Type I.
- E. Fly Ash: ASTM C618, Class C or F. Use only one type and source throughout project.
- F. Slag: ASTM C989, Grade 100 or 120. Use only one type and source throughout project.
- G. Exterior Pavement Joint Materials
  - 1. Joint Back-up Material: Polyethylene foam, 100% closed cell.
  - 2. Sealant:
    - a. Dow 888, by Dow Corning.
    - b. 301 NS by Pecora.
    - c. Spectrum 800 or 900 by Tremco.
- H. Aggregate: ASTM C33.
- I. Water: Clean and potable
- J. Dowel Bars: ASTM A615, grade 60, and plain steel bars.
- K. Air Entrainment: ASTM C260. .
  - 1. Air-Mix or AEA-92, by Euclid Chemical Corp.
  - 2. MasterAir VR 10, MasterAir AE 90, or MasterAir E 200 by BASF Admixtures.
  - 3. Daravair or Darex Series, by W.R. Grace.
  - 4. Equivalent approved products.
- L. Liquid Membrane Curing and Sealing Compound: ASTM C1315, Type I, Class A or B, 25% minimum solids content, clear non-yellowing with no styrene-butadiene.
  - 1. Water Based, VOC less than 350 g/l:
    - a. Super Aqua Cure, by Euclid Chemical Corp.
    - b. MasterKure CC 1315WB by BASF Admixtures.
- M. Dissipating Curing Compound: ASTM C309 Type 1, Class A or B.
  - 1. Solvent base, VOC less than 350 g/l: Cetri Vex EnvioCure 100 by Vexcon.

## 2.2 CONCRETE MIXING

- A. Mix concrete and deliver in accordance with ASTM C94. Design mix shall produce normal weight concrete consisting of Portland cement, supplementary cementitious materials, aggregates, admixtures and water to produce the following:
  - 1. Compressive Strength: 4,000 psi minimum at 28 days unless otherwise indicated on the Drawings.
  - 2. Slump Range: 2"-4" for hand placed concrete, 1-1/4" to 3" for machine placed (slipform) concrete.
  - 3. Air Entrainment: 5 to 8 percent.
- B. Supplementary Cementitious Materials (SCM):
  - 1. Concrete mix shall contain SCM at the amounts specified unless other amounts are approved by the Civil Engineer. Either fly ash or ground granulated blast furnace slag (GGBFS) may be used for the SCM but shall not be used together to form a ternary mix. Use of fly ash or GGBFS in the concrete mix is mandatory.
  - 2. Fly Ash: Substitute fly ash for Portland cement at 15% of the total cementitious content.
    - a. If used to mitigate potential aggregate reactivity, only Type F fly ash may be used and shall have the following maximum properties: 1.5% available alkali and 8.0% CaO. When a maximum of 25% replacement is used, up to 10.0% CaO is permitted.
  - 3. Ground Granulated Blast Furnace Slag (GGBFS): Substitute GGBFS for Portland cement at 20% of the total cementitious content.
    - a. If required to mitigate potential sulfate exposure or aggregate reactivity, up to 50% substitution of Portland cement is allowed.
  - 4. Maintain air-entrainment at specified levels.
- C. Calcium chloride:
  - 1. Calcium chloride (Type L) may be used in solution form as part of the mixing water to accelerate concrete setting and early-strength development.

- a. Amount of calcium chloride added shall not be more than necessary to produce the desired results and shall not exceed 2% by weight of cement.
- b. The dosage range for the calcium chloride for the entire project shall not vary by more than 1%. Range is defined as the difference between the maximum and minimum dosages of calcium chloride for the entire project.
- c. Calcium chloride shall not be used in the following applications unless approved by the Civil Engineer:
  - 1) concrete containing embedded dissimilar metals or aluminum
  - 2) slabs supported on permanent galvanized steel forms
  - 3) concrete exposed to deicing chemicals
  - 4) prestressed or post-tension concrete
  - 5) concrete containing aggregates with potentially deleterious reactivity and concrete exposed to soil
  - 6) concrete exposed to soil or water containing sulfates.
2. Use calcium chloride in accordance with manufacturer's recommendation.
3. Chloride-ion Concentration:
  - a. Maximum water-soluble chloride-ion concentrations in hardened concrete at ages from 28 to 42 days contributed from the ingredients including water, aggregates, cementitious material, and admixtures shall not exceed the following limits unless approved by the Civil Engineer:

Type of Member	Maximum water-soluble chloride ion (Cl-) content in concrete (percent by weight of cement)
Prestressed concrete	0.06
Reinforced concrete exposed to chloride in service	0.15
Reinforced concrete that will be dry or protected from moisture in service	1.00
Other reinforced concrete construction	0.30

4. When using calcium chloride or other admixtures containing chlorides, measure water-soluble chloride-ion content (percent by weight of cementitious materials) per ASTM C1218. Sample shall be from concrete representing the submitted mix design and maximum chloride dosage anticipated for the project.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Begin paving work only after unsuitable areas have been corrected and are ready to receive paving.
- B. Remove loose material from compacted base material surface to produce firm, smooth surface immediately before placing concrete.

#### 3.2 INSTALLATION

- A. Form Construction
  1. Set forms to required grades and lines, rigidly braced and secured.
  2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place minimum of 24 hours after concrete placement.
  3. Check completed formwork for grade and alignment to following tolerances:
    - a. Top of forms not more than 1/8-inch in 10'-0".
    - b. Vertical face on longitudinal axis, not more than 1/4-inch in 10'-0".
  4. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.
- B. Reinforcement: Fasten reinforcing bars or welded wire fabric (if required) accurately and securely in place with suitable supports and ties. Remove from reinforcement all dirt, oil, loose mill scale, rust, and other substances that will prevent proper bonding of the concrete to the reinforcement.
- C. Concrete Placement

1. Concrete shall be mixed and placed when the air temperature in the shade and away from artificial heat is a minimum of 35 degrees F and rising. Hot and cold weather concreting shall be in accordance with ACI 305R (hot weather) and 306.1 and 306R (cold weather). Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until set at required finish elevation and alignment.
2. Place concrete using methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
3. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place construction joint. Automatic machine may be used for curb and gutter placement. Machine placement shall be at required cross section, line, grade, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified herein.

D. Joint Construction

1. Contraction Joints: Construct concrete curb or combination concrete curb and gutter, where specified on Construction Drawings, in uniform sections of approximately 10 feet in length. Form joints between sections either by steel templates, 1/8-inch in thickness, of length equal to width of curb and gutter, and with depth which will penetrate at least 2-inches below surface of curb and gutter; or with 3/4-inch thick performed expansion joint filler cut to exact cross section of curb and gutter; or by sawing to depth of at least 2-inches while concrete is between 4 and 24 hours old. If steel templates are used, they shall be left in place until concrete has set enough to hold its shape, but shall be removed while forms are still in place.
2. Longitudinal Construction Joints: Tie concrete curb or combination concrete curb and gutter, to concrete pavement with 1/2-inch round deformed reinforcement bars 2 feet in length and 5 feet on center.
3. Transverse Expansion Joints: Concrete curb, combination concrete curb and gutter, or concrete sidewalk shall have filler cut to exact cross section of curb, gutter, or sidewalk. Joints shall be spaced at approximately 100 feet on center and shall be similar to the type of expansion joint used in concrete pavement areas.

E. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2-inch or more than 1-inch below finished surface where joint sealer is indicated. Furnish joint fillers in 1-piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.

F. Joint Sealants: Install in accordance with manufacturer's recommendations.

### 3.3 CONCRETE FINISHING

- A. After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.
- B. Work edges of sidewalks, gutters, back top edge of curb, and formed joints with edging tool, rounding edge to 1/2-inch radius. Eliminate tool marks on concrete surface. After completion of floating and trowelling, when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
  1. Curbs, gutters, and sidewalks: Broom finish by drawing fine-hair broom across surface perpendicular to flow of traffic. Repeat operation as necessary to produce fine line texture.
- C. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections with major defects as directed Owner.
- D. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable work as directed by Owner.

### 3.4 CURING AND PROTECTION

- A. Protect and cure finished concrete paving using with curing compound or with acceptable moist-curing methods in accordance with "water-curing" section of ACI 308. Cure for a period not less than 7 days.
- B. Use solvent based curing compound when compound is applied below 40 F.

3.5 BACKFILL

- A. After concrete has set sufficiently, spaces on either side of concrete curb, combination concrete curb and gutter, or concrete sidewalk shall be refilled to required elevation with suitable material compacted in accordance with Section 02300.

3.6 CLEANING AND PROTECTION

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

3.7 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor as necessary to assure compliance with Contract requirements.

END OF SECTION

CONCRETE MIX DESIGN SUBMITTAL FORM  
(Section 02770 – Curbs and Sidewalks)

Date

SITE INFORMATION

ADDRESS \_\_\_\_\_  
CITY, ST \_\_\_\_\_  
GENERAL CONTRACTOR \_\_\_\_\_  
COMPANY \_\_\_\_\_  
JOBSITE PHONE \_\_\_\_\_

A. CONCRETE INFORMATION

Supplier Mix Design #	_____
Design Strength (f'c)	_____ psi
Water / Cementitious Ratio	_____
Total Air Content	_____ %
Total Est. Volume of Concrete	_____ CY
Mix Developed From:	
<input type="checkbox"/> Trial Mix Test Data ( <i>attach test data</i> )	
<input type="checkbox"/> Field Experience	
Density	
Wet _____ pcf	Dry _____ pcf
Slump	
“ _____ ( ± 1” ) <b>WITHOUT</b> WR Admixture	
“ _____ ( ± 1” ) <b>WITH</b> WR Admixture	

LEAVE BLANK FOR ENGINEER'S STAMP

B. ADMIXTURE INFORMATION

	ASTM Designation	Product (Manufacturer/Brand)	Dosage (ounces)	
			oz / cy	oz / cwt
Water Reducing				
Accelerating				
Retarding				

**C. MIX DESIGN**

Mix Proportions (per cubic yard)

	Identification (Type, size, source, etc.)	Weight (pounds)	Density (SSD)	Volume (cubic feet)	% Aggregate Absorption
Cement					
Fly Ash					
Slag					
Coarse Aggregate #1					
#2					
#3					
Fine Aggregate #1					
#2					
Water					
Air Content					
	TOTALS				

## Coarse &amp; Fine Aggregate Gradation Information

Sieve Size	% Passing Each Sieve (All Sieve Sizes must be entered)					Combined % Passing	Combined % Retained	
	Coarse Agg. # 1	Coarse Agg. # 2	Coarse Agg. # 3	Fine Agg. # 1	Fine Agg. # 2		Cumulative	Individual
% of Vol								

## Aggregate Ratios

Coarseness Factor =	$\frac{\text{Combined \% cumulative retained } 3/8'' \text{ sieve}}{\text{Combined \% cumulative retained } \#8 \text{ sieve}} =$	
Workability Factor =	Combined \% passing #8 sieve =	
Adj-Workability Factor =	$WF + [(Cementitious \text{ Material} - 564) \div 37.6] =$	
Allowable Adj-WF=	$Adj-WF = [(11.25 - .15 \text{ CF}) + 34.5] \pm 2.5$	= Low High

**D. ATTACHMENTS:** Include the following with this Mix Design Report.

- ☐ Portland Cement mill test reports
- ☐ Fly ash mill test reports
- ☐ Slag mill test reports

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- ☐ Designation, type, quality, and source (natural or manufactured) of coarse and fine aggregate materials
- ☐ Separate aggregate gradation reports including all required sieve sizes
- All gradation sieve report tests dated within 60 days of this report
  - Report for each coarse and fine aggregate material in mix
- ☐ Statement if possible reactivity of aggregate, based on tests or past service
- ☐ Statement if possible aggregate pop-outs or their disruptions, based on tests or past service
- ☐ Product data for the following admixtures:
- Chloride ion data and related calculations
  - Water reducing, set retarding, set accelerating, etc.
- ☐ Measured water-soluble chloride ion content in concrete (percent by weight of cement)
- ☐ Concrete compressive strength data used for standard deviation calculations

#### E. CONCRETE SUPPLIER INFORMATION

Company Name _____ Address _____ City, ST Zip _____ Technical Contact _____  Sales Contact _____	Tel. #   Cell #  e-mail  Cell #	(      ) _____  (      ) _____ _____ (      ) _____				
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center; border-bottom: 1px solid black;">PRIMARY PLANT</td> <td style="width: 50%; text-align: center; border-bottom: 1px solid black;">SECONDARY PLANT</td> </tr> <tr> <td style="vertical-align: top;">           Plant Location: _____            Miles from Site: _____            Travel Time to Site: _____            NRMCA Certified: <input type="checkbox"/> YES <input type="checkbox"/> NO            State DOT Certified: <input type="checkbox"/> YES <input type="checkbox"/> NO            Batch Mixing Type: <input type="checkbox"/> DRY <input type="checkbox"/> CENTRAL MIX         </td> <td style="vertical-align: top;">           _____            _____            _____  <input type="checkbox"/> YES <input type="checkbox"/> NO  <input type="checkbox"/> YES <input type="checkbox"/> NO  <input type="checkbox"/> DRY <input type="checkbox"/> CENTRAL MIX         </td> </tr> </table>			PRIMARY PLANT	SECONDARY PLANT	Plant Location: _____ Miles from Site: _____ Travel Time to Site: _____ NRMCA Certified: <input type="checkbox"/> YES <input type="checkbox"/> NO State DOT Certified: <input type="checkbox"/> YES <input type="checkbox"/> NO Batch Mixing Type: <input type="checkbox"/> DRY <input type="checkbox"/> CENTRAL MIX	_____ _____ _____ <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> DRY <input type="checkbox"/> CENTRAL MIX
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## SECTION 02812 – SITE IRRIGATION SYSTEM

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes

1. Underground, automatically controlled lawn and shrub bed irrigation system including electrical connections, water main connections, and accessories.

##### B. Related Requirements

1. Section 02300 - Earthwork. Trenching, backfill, and compaction for utilities.
2. Section 02510 - Water Distribution Systems.
3. Section 02900 - Planting. Extended Maintenance Service for Site Irrigation System.
4. Section 02370 - Erosion Control

#### 1.2 REFERENCES

##### A. ASTM International (ASTM)

1. ASTM D2239 - Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter.
2. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
3. ASTM D2564 - Solvent Cement for poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
4. ASTM D2609 - Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
5. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

##### B. National Fire Protection Agency (NFPA)

1. NFPA 70 - National Electrical Code (NEC).

##### C. American Society of Safety Engineers

1. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers.
2. ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies.

#### 1.3 SUBMITTALS

- ##### A. Submittal process: Submit in accordance Section 01330 - Submittal Procedures. Submit required submittals within 30 days after contract award.

##### B. Test Reports

1. Pressure Tests: Contractor shall submit the following pressure tests performed by the Contractor:
  - a. Pre-Installation Static Pressure Test: Perform static pressure test at the irrigation system's water source to verify available pressure for system operation.
  - b. Hydrostatic Test of Installed Irrigation Main Line: Perform hydrostatic test of installed irrigation main line in conformance with ASTM to verify system is free of any leaks prior to proceeding with the installation of the system.

##### C. Closeout Submittals:

1. As-Built Drawings: Furnish two sets, noting exact locations of elements and changes to Construction Drawings.
2. Operation Manual: Furnish two copies, bound in 1 inch diameter three ring binders, indexed and tabbed for easy reference, and labeled on spine and cover. Manual shall include following:
  - a. Approved submittals as specified herein.
  - b. Installation instructions including mounting details for control valves.
  - c. Operating Instructions:
    - 1) Winterization procedures.

- 2) Recommended operation sequence, frequency, and length of operation cycle, as per relationship to estimated absorption rate, evaporation rate, and anticipated flow.
- d. Maintenance Instructions:
  - 1) Manufacturers' product data, installation, and maintenance instructions.
  - 2) Copies of completed warranty information. Contractor to complete and mail necessary warranty registration information to manufacturer keeping copies for Owner.
3. Controller Chart: Prepare color coded chart reduced in size, mounted on the inside of the controller cabinet, containing same plan information as as-built drawings, and laminated in plastic on both sides, with following specific information:
  - a. Note routing of main line, control wires, and controller location.
  - b. Identify valves as to size, station number shown on controller, and type of irrigation head (e.g. micro spray head, rotary head) for each valve.
  - c. Delineate each station's limits of coverage by color-coding, with each station having different color showing its zone with zone number designation.
  - d. Size, type, and location of water source.
4. Certification of Conformance: Provide certificate of satisfactory performance of irrigation system installation signed by the Contractor.

#### 1.4 PROJECT CONDITIONS

- A. Visit site and become familiar with nature and location of work, existing conditions, and conditions that will exist during installation.

### PART 2 - PRODUCTS

#### 2.1 PIPE

- A. Polyvinyl Chloride (PVC): Pipe over 1 inch diameter shall conform to ASTM D224, SDR 21, and Class 200.
- B. Polyvinyl Chloride (PVC): Pipe 1 inch diameter and under shall conform to ASTM D2241, SDR 13.5, and Class 315.
- C. Flexible Polyethylene (PE): Pipe shall conform to ASTM D2239, SDR 11.5, PE23, rated at 100 PSI, National Sanitation Foundation (NSF) approved. Subject to approval of Owner, PE shall be used for laterals in areas where ground is subject to freezing for extended periods of time each year.
- D. Joints:
  1. Pipe sizes 2 1/2 inch or smaller shall have bell and socket joints.
  2. Pipe sizes larger than 2 1/2 inch shall have snap connections with rubber gasket joints. Thrust blocking shall be required in accordance with Section 02510.
- E. Pipe used for reclaimed water shall be appropriate color and marked as designated for such use.
- F. Fittings:
  1. Polyvinyl Chloride (PVC) Fittings: Fittings shall conform to ASTM D2241, Schedule 40, and Molded.
  2. Flexible Polyethylene (PE) Lateral Line Fittings: Fittings shall conform to ASTM D2609, Type 1 PVC insert fittings designed for used with this type of pipe. Pipe and fittings shall be joined with stainless steel pinch clamps or worm gear clamps, including stainless steel screw.
- G. Risers above finished grade shall be black in color or receive 2 coats of black exterior semi-gloss enamel paint if a color other than black.

#### 2.2 ACCESSORIES

- A. Sleeves: Sleeves for pipes passing beneath paving shall conform to ASTM D2241, Schedule 40. Minimum diameter of 4 inch or 2 sizes larger than pipe scheduled to pass through them.

- B. PVC Solvent Cement: Cement shall conform to ASTM D2564.
- C. Swing Joint Connections: Connections between heads and laterals shall be thick wall, flexible, polyethylene pipe, with fittings that have male barbs on one end and either male or female screw ends opposite. Glue fittings and female barb adapters are not allowed.

## 2.3 RECLAIMED WATER PRODUCTS AND MATERIALS

- A. Irrigation products used with reclaimed water shall be the appropriate color and marked as designated for such use.

## 2.4 CUTOFF OR ISOLATION VALVES

- A. 3 inches or Smaller: Provide full port brass ball valves with 600 WOG rating as manufactured by Red-White Valve Corporation, Carson, CA.
- B. Larger than 3 inches: Provide cast iron and bronze mechanical joint valves, fusion bonded epoxy coated exterior and interior, Resilient Wedge Valve as manufactured by Clow Valve Co., Oskaloosa, IA.
- C. Provide a valve key and cast iron cylindrical valve box with top with each valve.

## 2.5 QUICK COUPLER VALVES

- A. Provide one of following if shown on the plans:
  1. Rain Bird model 44NP Valve with model 44K Key.
  2. Hunter model HQ-44LRC with model HK-44 Key.
  3. Toro model 100-SLVLC 470 Series Valve and 100-SLK Coupler Key.
- B. Provide each valve with key having 3/4 inch male top pipe threads for hose connection.

## 2.6 ELECTRIC CONTROL VALVES

- A. Provide one of the following:
  1. Hunter ICV Series electric remote control valves and ICZ Drip Zone Control Kit.
  2. Rain Bird PEB Series electric remote control valves and XCZ Drip Control Zone Kit.
  3. Netafim Control Valve Kit.
  4. Toro P220 Series plastic valves and DZK Drip Zone Valve Kit.
- B. Provide 3M DBY watertight connectors.

## 2.7 SPRINKLER HEADS

- A. Full or Part Circle Pop-Up Fixed Spray Sprinkler:
  1. Acceptable Products:
    - a. Hunter PRS40 with MP Rotators and check valve (CV) feature.
    - b. Rain Bird 1800 Series Sprinklers with Rotary Nozzles including PRS and SAM features.
    - c. Toro 570Z PRX Series with MPR Precision Series Spray Nozzles.
- B. Full or Part Circle Pop-up Gear Driven Rotor Sprinkler:
  1. Acceptable Products:
    - a. Rain Bird Rotor, 5000 Series plus MPR rotor nozzle with Seal-A-Matic (SAM) check valve.
    - b. Toro Super T5P-COM, with check valve or Toro TR-XTP Series with factory installed check valve, trajectory adjustment, and X Flow Device.
    - c. Hunter PGP and PGJ series pop-up rotors, with check valve.
- C. Pressure Compensating Micro-Spray Nozzles:
  1. Acceptable Products:
    - a. Rain Bird Micro Spray.

- b. Hunter Micro Spray.
- c. Toro Stream Spray and Stream Bubbler Nozzles with PC.

## 2.8 LOW VOLUME AND DRIPLINE IRRIGATION

- A. Rain Bird XT-700 distribution tubing
- B. Rain Bird Xeri-Bug Emitters XB-05-PC, XB-10-PC, XB-20-PC (refer to plans for specific volumes)
- C. Hunter Professional Landscape Dripline with 0.4, 0.6, or 1.0 GPH built-in emitters.
- D. Netafim Techline with 0.4, 0.6, or 0.9 GPH dripper.
- E. Toro Drip-In PC drip tubing with 0.5 or 1.0 GPH emitter. Use only in groundcover and shrub beds with mulch.
- F. Rain Bird XFD (surface installation) or XFS (subsurface installation) drip tubing and components with 0.6 or 0.9 GPH emitter.

## 2.9 VALVE BOX

- A. Valve boxes shall be manufactured by Ametek, Plymouth Products Division, Sheboygan WI., RainBird Corporation or equal by acceptable manufacturer. No irrigation valve box shall be placed in pavement areas unless otherwise shown on the Drawings.
  - 1. When used with single valve, provide Economy Turf Box or Rain Bird model VB-RND with green colored snap fit cover labeled "Valve Box".
  - 2. When used with 2 or more valves, provide Jumbo Box or Rain Bird model VB-STD with 20 inch x 14 inch cover opening with cover labeled "Control Valve".

## 2.10 MANUAL DRAIN VALVES

- A. Manual drain valves shall be provided by acceptable manufacturers specified above.

## 2.11 CONTROL WIRE

- A. Number 14-size minimum copper wire, U. L. approved for underground direct burial.
  - 1. Colored wire shall have same color-coding as shown on controller.
  - 2. All power and control wiring shall be in PVC conduit as shown in the irrigation detail sheets.
  - 3. Provide single wire from controller to each valve.
  - 4. Provide common neutral from controller to each valve.
  - 5. Provide a minimum of two extra sets of wire, 2 control and 1 neutral, to each end of the main for future use.
    - a. Loop Systems: Provide two spare control wires in each direction to halfway point of loop.

## 2.12 BACKFLOW PREVENTER

- A. General Contractor to coordinate location of backflow preventer with Architectural / Plumbing drawings.
- B. Comply with requirements and codes of local governing authority regarding backflow prevention.
- C. Provide the necessary materials, insulation/drainage capabilities, and insulated fiberglass enclosure, dark green in color.
- D. Backflow preventers shall be type suitable for use in high hazard cross connection to potable water system as manufactured by one of the following manufacturer's: Watts Regulator Company, Febco, or Wilkins.
  - 1. Reduced pressure backflow preventers shall be ASSE # 1013 and labeled accordingly.
  - 2. Double check valve assembly backflow preventers shall be ASSE # 1015 and labeled accordingly.
  - 3. In absence of local codes or requirements, provide double check assembly backflow preventer installed in strict accordance with manufacturer's written instructions.

2.13 METER

- A. Meter and meter box shall conform to requirements of local utility company.

2.14 AUTOMATIC CONTROLLER

- A. Hunter XC-200i
- B. RainBird ESP-ME

PART 3 - EXECUTION

3.1 PREPARATION

- A. Pressure/Flow Test: Perform calculations according to the Irrigation Association's 3-Step Method. Provide written calculations to the Owner's CEC including the following site information:
  - 1. Static or residual pressure at the POC.
  - 2. Calculation of pressure for "worst case" sprinkler head.
  - 3. Calculation of GPM per zone.
- B. Prior to installation, receive approval from General Contractor to proceed with construction.
- C. Contractor shall field verify all above ground and underground utilities prior to start of work.

3.2 EXCAVATION

- A. Trenching and Backfilling:
  - 1. Irrigation mainline installation shall conform to same requirements as waterline installation.
  - 2. Trenching and backfilling shall conform to Section 02300 and 02370.
  - 3. Excavate trench to proper depth as shown or specified.
  - 4. Minimum trench width shall be 3 1/2 inches.
  - 5. Over excavate trenches deeper than required in soils containing rock or other hard material that might damage pipe and backfill to proper depth with selected fine earth or sand.
  - 6. Backfill and hand tamp over excavation prior to installing piping.
  - 7. Keep trenches free of obstructions and debris that would damage pipe.
  - 8. Irrigation piping shall not be installed in same trench as heating duct, electric ducts, storm and sanitary sewer lines, water and gas mains.
- B. Do not cut sidewalks, paved areas, or curb and gutter when trenching for piping unless otherwise noted on the Drawings.
  - 1. Provide sleeves as specified in Part 2 above under paving prior to installation of paving.
  - 2. Auger, bore, or tunnel under existing paving without disturbing pavement. Damaged pavement shall be removed and replaced in accordance with Section 02740 or 02751.

3.3 WATER METER

- A. Provide water meter box for irrigation system if required or shown on the Drawings.

3.4 PIPING INSTALLATION

- A. Minimum cover from top of piping to finished grade shall be provided as follows:
  - 1. Lawn and planting areas:
    - a. Mains and Control Valves: 18 inches.
    - b. Laterals: 12 inches.
  - 2. Drives or parking areas: 24 inches.

- B. Clearances: Maintain 3 inch minimum horizontal clearance between parallel lines in same trench or vertical clearance between lines crossing at angles.
- C. Special Requirements - PVC and PE pipe:
  - 1. Snake pipe in trench at least 1 foot per 100 feet of pipe to allow for thermal expansion.
  - 2. Pipe laterals shall be laid to drain to low point drains located at lowest elevations of each zone.
- D. Rest full length of pipe section on bed of trench, excavating recesses to accommodate joints. Do not lay pipe on unstable material or blocking, or when in opinion of Owner conditions are unsuitable.
- E. Threaded Plastic Pipe Jointing:
  - 1. Do not use solvent cement on threaded joints.
  - 2. Wrap joints with Teflon tape or use virgin Teflon lubricant.
- F. Bell and Socket Plastic Pipe Jointing: Cement joints in accordance with ASTM D2855.

### 3.5 QUICK COUPLER AND AUTOMATIC LOW POINT DRAIN VALVES

- A. Provide quick coupler valves as shown on the drawings to accommodate winterization.
- B. Provide automatic low point drain valves on all zones. Provide two valves at lowest point of each zone with each drain installed above a 12 inch by 12 inch by 12 inch deep area of coarse washed gravel.

### 3.6 SLEEVING

- A. Provide sleeves for both piping and control wiring where either passes under paved surfaces.
  - 1. Depths of sleeves shall be same as that required for piping at each location or condition.
  - 2. Extend sleeves 12 inches beyond paving at each end.
  - 3. Install permanent benchmark at top of curbs for reference to sleeve locations.

### 3.7 VALVES

- A. Do not locate beneath paved surfaces.
- B. Do not locate any valve within 5'-0" of any curb.
- C. Install plumb to within 1/16 inch.
- D. Locate within valve box with 6 inch deep layer of coarse gravel beneath bottom of valve. Valve boxes shall not be located within 5'-0" of any curb.
- E. Top of quick coupler valves shall be 6 inches to top of valve box. Top of gravel layer shall be 3 inches below top of valve.
- F. Master Valve (if required on the Drawings):
  - 1. Locate immediately behind backflow preventer.
  - 2. Valve shall be energized by master valve circuit on automatic controller.

### 3.8 SPRINKLERS

- A. Install plumb to within 1/16 inch with top collar, not nozzle, flush with finish grade.
- B. Provide swing joint with each sprinkler except where entire head is raised above grade and/or where rigid riser piping is required.
- C. Heads adjacent to paving and curb: Locate between 6 and 12 inches from edge of paving or back of curb to prevent car overhang to conflict with a fully extended sprinkler.

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### 3.9 ELECTRICAL CONNECTIONS AND CONTROL WIRE

- A. Conform to the National Electrical Code (NEC) and local electrical codes.
- B. Provide electrical connection to system as designated on the Drawings and as specified herein.
- C. Wire Placement:
  - 1. Do not run control and power supply wiring in same conduit.
  - 2. Provide continuous runs of wire between controller and valves. Splices shall be made with one of following:
    - a. Watertight below ground electrical junction boxes.
    - b. Water-tight connectors, such as utilized for valves, and located within valve box for ease of locating.
    - c. The location of electrical splices shall be shown on the As-Built drawings.
  - 3. Bury control wire beside pipe in same trench. Bundle and tape together at not more than 10 ft intervals.
- D. Expansion Loops: Construct by wrapping wire around 1/2 inch diameter pipe to create coil. A 3 foot section of wire shall be used to create 12 inch coil with 6 foot section being used to create 24 inch coil.
  - 1. Provide 12 inch coils at each wire splice, not including valves, and at each change of wire direction.
  - 2. Provide 24 inch coils at each control valve and where each valve enters conduit for automatic controller.

### 3.10 BACKFILLING

- A. Sand or fine-grained soils shall be used for initial backfill to sufficient depth to prevent damage to pipe from rocks or other debris during compaction of subsequent backfill.
- B. Fill trench to within 3 inches of finish grade with excavated soil and compact in accordance with Section 02300.
- C. Fill top 3 inches with existing topsoil in planting or turf areas and wheel roll until compaction of backfill is same as surrounding soil.
- D. Grade backfilled trench uniform with surrounding grades.

### 3.11 BACKFLOW PREVENTER

- A. Comply with local codes for installation of backflow preventer. In absence of local codes, install in accordance with manufacturer's written instructions.

### 3.12 RAINFALL / FREEZE SENSOR

- A. Location and installation shall be as shown on the Drawings and per manufacturer's written recommendations.

### 3.13 AUTOMATIC CONTROLLER

- A. Location and installation shall be as shown on the Drawings and approved by Owner prior to installation.
- B. Install rigid conduits for both power supply and control wiring.
  - 1. Control wire conduit shall extend to 18 inches below grade.
  - 2. Pull spare wires for future valves and extend to area outside paved surfaces.
- C. Install electrical grounding for controller in accordance with manufacturer's written instructions.

### 3.14 FIELD QUALITY CONTROL

- A. Irrigation Inspections: Conduct the following inspections during the course of the work:
  - 1. Mainline Inspection: Inspect the installed main line, electronic control valves, wiring prior to backfilling main line.
  - 2. Substantial Completion Inspection: Inspect all completed irrigation work.

3. Final Inspection: Within 30 days of project substantial completion date and subsequent to correction of punch list deficiencies, convene a final inspection of all irrigation work.

B. Inspection and Adjustments: Following installation and prior to Substantial Completion Inspection, make final adjustments to site irrigation including but not limited to the following:

1. Flush system completely, with nozzles and screens removed and drip lines ends open to extract debris.
2. Verify sprinkler operation and alignment for direction of throw. Correct as necessary.
3. Check pop-up rotor/rotator nozzling for proper arc of spray with no overthrow onto pavement. Adjust nozzles as necessary for proper throw and matched precipitation rate.
4. Ensure uniform distribution exists.
5. Ensure proper irrigation head operational after landscaping and/or sod installation.

C. Main Line Inspection and Hydrostatic Tests:

1. Center load piping with small amount of backfill to prevent arching or slipping under pressure.
2. Install risers and caps on mainline and sub-main lines. Apply continuous and static water pressure of 75 psi for a minimum of 3 hours when welded plastic joints have cured at least 3 hours.
3. Allowable Leakage:
  - a. Utilize the following formula to calculate the allowable leakage for O-ring gasket pipe.
$$L = \frac{SD(P)^{0.5}}{133,200}$$
In which: L=Allowable leakage in gallons per hour  
S=Length of pipe tested in feet  
D=Pipe diameter in inches  
P=Average test pressure in PSI gauge
  - b. No allowable leakage shall be acceptable with solvent based mainline system.
4. Repair leaks and retest.

3.15 CLOSEOUT ACTIVITIES.

- A. Demonstration: Following final adjustment, operate entire irrigation installation to demonstrate complete and successful operation of equipment.

END OF SECTION

## SECTION 02890 - TRAFFIC SIGNS AND SIGNALS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Traffic control signs.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM):
  - 1. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - 2. ASTM C94 - Ready Mix Concrete
  - 3. ASTM D4956 - Retroreflective Sheeting for Traffic Control.
- C. US Department of Transportation, Federal Highway Administration:
  - 1. Manual on Uniform Traffic Control Devices (MUTCD).

### PART 2 - PRODUCTS

#### 2.1 SIGNS

- A. Conform to US Department of Transportation [MUTCD](#). Sign classification, type, size, and color shall be as shown on the drawings
- B. Retroreflectivity: Microprismatic type sheeting conforming to ASTM D 4956, Type VIII, IX, or XI.

#### 2.2 POSTS

- A. Square Post: Square tubular steel sign post, galvanized, 12 ga, perforated full-length with 7/16 inch holes on four sides. Post size shall be as shown on the Drawings.
- B. Steel Pipe: ASTM A 53, Type E (electric-resistance welded) or Type S (seamless), Grade B, Schedule 40, size as shown on the Drawings.

#### 2.3 CONCRETE

- A. Mix concrete and deliver in accordance with ASTM C 94.
- B. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce following:
  - 1. Compressive Strength: 3,500 psi, minimum at 28 days, unless otherwise indicated on the Drawings.
  - 2. Slump Range: 1 to 3-inches at time of placement
  - 3. Air Entrainment: 5 to 8 percent

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Field verify underground utilities prior to sign installation. Primary utilities of concern of shallow depths are lawn sprinkler systems, electric, telephone, fiber optic, cable and gas.

- B. Cost related to repair of damaged surface and subsurface facilities shall be paid by the Contractor at no additional expense to the Owner.

### 3.2 INSTALLATION

- A. Install signs as shown on the Drawings and in accordance with MUTCD and manufacturer's instructions.
- B. Install signs of the type and at locations shown on the Drawings.
- C. Install posts of the type as shown on the drawing.
- D. Where shown as painted, field paint steel pipe posts in accordance with Section 09900.

END OF SECTION

## SECTION 02900 – PLANTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Planting of trees, shrubs, sod, seed, groundcover, and associated materials.
- B. Related Requirements:
  - 1. Section 02300 - Earthwork.
  - 2. Section 02370 - Erosion and Sedimentation Control.
  - 3. Section 02812 - Site Irrigation System.

#### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American National Standards Institute (ANSI):
  - 1. ANSI Z60.1 - American Standard for Nursery Stock.
- C. ASTM International (ASTM):
  - 1. ASTM D5268 - Topsoil used for Landscaping Purposes.
  - 2. ASTM C602 - Agricultural Liming Materials.
- D. Erosion Control Technology Council (ECTC):
  - 1. Standard Specification for Rolled Erosion Control Products.

#### 1.3 SUBMITTALS

- A. Grower / Nursery Information: Submit name, address, phone number and contact person for each Grower / Nursery 30 days prior to plant material selection.
- B. Materials Test Reports: Submit topsoil test reports to Owner's Civil Engineering Consultant (CEC) minimum 6 weeks prior to placement of topsoil.
  - 1. Provide location of topsoil borrow area if topsoil is to be imported.
  - 2. Provide name of independent soil testing laboratory.
  - 3. Provide date of sampling and testing.
- C. Product Data:
  - 1. Submit certification tags from trees, shrubs, sod, and seed verifying type and purity to Owner's CEC.

#### 1.4 QUALITY ASSURANCE

- A. Plant Material Selection:
  - 1. Trees: The contractor is responsible for verifying the availability of the specified trees, providing the Landscape Architect with representative photographs, and securing a block prior to delivery. Trees delivered to the site shall be similar in size and quality to an approved photographed sample.
  - 2. Shrubs: Deliver representative samples of each shrub variety and size to the Project site for verification of specification compliance. Mark shrubs with size, genus, species, cultivar, and variety.
  - 3. Tagging and observation will be based on compliance with requirements for genus, species, variety, cultivar, size, and quality.
  - 4. Remove rejected trees or shrubs immediately from Project site.

- B. Plant Measurements: Measure according to ANSI Z60.1. Spread, height, or container sizes shown on the drawings are minimum acceptable sizes. Do not prune to obtain required sizes. If range of sizes is given, no plant shall be less than minimum size, and at least 50 percent of plants shall be as large as upper half of range specified. All minimum sizes shall be met.
  - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread. Do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
  - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- C. Soil-Testing Laboratory Qualifications:
  - 1. Topsoil Analysis: Independent soil testing laboratory employing a landscape or soil agronomist familiar with the final use of the material and construction practices for large earthwork sites.
- D. Quality Assurance Inspections: [RESERVED]

## 1.5 PROJECT CONDITIONS

- A. Perform work only during weather conditions favorable to landscape construction and to health and welfare of plants. Owner shall determine suitability of such weather conditions.

## PART 2 - PRODUCT

### 2.1 WOODY PLANT MATERIALS

- A. Furnish nursery-grown trees and shrubs complying with ANSI Z60.1 and the following requirements:
  - 1. Provide plants with healthy root systems developed by transplanting or root pruning.
  - 2. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as disfiguring knots, sun scald, injuries, abrasions, and disfigurement.
  - 3. Provide selected specimen quality plants being exceptionally heavy, symmetrical, tight knit, so trained or favored in their development and appearance as to be superior in form, number of branches, compactness and symmetry.
  - 4. Do not prune plants before delivery.
  - 5. Trees with fresh cuts of limbs over 1 1/4-inch, which have not completely calloused, shall be rejected.
  - 6. Provide plants typical of their species or variety and exhibiting a normal habit of growth and be legibly tagged with proper name. Provide plants grown under climatic conditions similar to those of site or have been acclimated to such condition for at least 2 years.
  - 7. Root system of each plant shall be well-provided with fibrous roots. Parts shall be sound, healthy, vigorous, well-branched, and densely foliated when in leaf.
  - 8. Plants designated ball and burlap shall be moved with root systems as solid units with balls of earth firmly wrapped with burlap and comply with the following:
    - a. Diameter and depth of balls of earth shall comply with the American Standards for Nursery Stock and be sufficient to encompass fibrous root feeding systems necessary for healthy development of plant.
    - b. No plant shall be accepted when ball of earth surrounding its roots has been cracked or broken preparatory to or during process of planting. Balls shall remain intact during all operations.
    - c. Heel-in plants that cannot be planted immediately by setting in ground and covering balls with soil or mulch and then watering.
    - d. Hemp burlap and twine is preferable to treated. If hemp burlap is used, twine is to be cut from around the base of the trunk and the upper 1/3 of the burlap is to be pulled down around the root ball and completely buried. If treated burlap is used, twine shall be cut from around trunk and burlap shall be removed. Any balled and burlapped tree that has not had the twine cut from around the base of the trunk and removed will be rejected.
  - 9. Provide single trunk trees growing from single unmutilated crown of roots. No part of trunk shall be conspicuously crooked as compared with normal trees of same variety.

10. Provide shrubs with thickness corresponding to trade classification "No.1". Single-stemmed or thin plants shall not be accepted. Side branches shall be generous, well-twiggged, and plant as whole well-branched to ground. Plants shall be in moist condition, free from dead wood, bruises, or other root or branch injuries.

## 2.2 LAWN SEED {RESERVED}

## 2.3 SOD

- A. Provide sod species suitable as lawn turf for the region. Sod shall be strongly rooted, weed, disease, pest free and uniform in thickness.

## 2.4 TOPSOIL

- A. ASTM D5268, natural, friable, fertile, fine loamy soil possessing characteristics of representative topsoil in the vicinity that produces heavy growth. Topsoil shall be free from subsoil, objectionable weeds, litter, sods, stiff clay, stones larger than 1-inch in diameter, stumps, roots, trash, herbicides, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations. Top soil shall contain:
  1. A pH range of 5.5 to 7.4 percent
  2. A Sand component range of twenty to sixty percent (20% - 60%)
  3. A Silt and Clay component range of thirty-five to seventy percent (35% - 70%)
  4. A maximum of five percent (5%) deleterious material
  5. A minimum of five percent (5%) organic material.
- B. Topsoil shall be tested in accordance with part 3 below.
- C. Salvaged or Existing Topsoil: Reuse suitable topsoil stockpiled on-site or existing topsoil undisturbed by grading or excavation operations. Clean topsoil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
- D. Verify amount of suitable topsoil stockpiled if any, and supply additional imported topsoil as needed.
- E. Imported Topsoil: Supplement salvaged topsoil with imported topsoil from off-site sources when existing quantities are insufficient.
  1. Obtain topsoil displaced from naturally well-drained sites where topsoil occurs at least 6 inches deep; do not obtain from agricultural land, bogs, or marshes.
  2. Verify borrow and disposal sites are permitted as required by state and local regulations. Obtain written confirmation that permits are current and active.
  3. Obtain permits required by state and local regulations for transporting topsoil. Permits shall be current and active.
- F. Amend existing and imported topsoil as indicated in part 3 below.

## 2.5 ORGANIC SOIL AMENDMENTS

- A. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- B. Back to Nature Cotton Burr Compost or approved equivalent.
- C. Compost: Decomposed organic material including leaf litter, manure, sawdust, plant trimmings and/or hay, mixed with soil.
- D. Pecan Hulls: Composted pecan hulls for local source.
- E. Biosolids: Use Grade 1 containing lower pathogen levels.

- F. Worm Castings: Earthworms.

## 2.6 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, Class O agricultural limestone containing a minimum of 80 percent calcium carbonate equivalent with a minimum of 95 percent passing No. 8 sieve and minimum of 55 percent passing No. 60 sieve.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing No. 6 sieve and a maximum of 10 percent passing No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.
- E. Sand: Clean, washed, natural or manufactured, free of toxic materials.

## 2.7 PLANTING ACCESSORIES

- A. Non Selective Herbicide: Roundup-Pro, Finale or equivalent.
- B. Selective Post Emergent Herbicide: EPA registered and approved, of type recommended by manufacturer for application.
- C. Selective Pre-Emergent Herbicide: EPA registered and approved, of type recommended by manufacturer for application.

## 2.8 PLANTING SOIL MIX

- A. Planting medium containing 75 percent specified topsoil mixed with 15 percent organic soil amendments and 10 percent sharp washed sand unless otherwise specified on the drawings.

## 2.9 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium.
  - 1. Composition: Nitrogen, phosphorous, and potassium in amount required to remedy deficiencies identified in the topsoil.
- B. Slow-Release Fertilizer: Use one of the following:
  - 1. Osmocote Standard Granular fertilizer by Scotts Company composed of 13 percent nitrogen, 13 percent phosphorous, and 13 percent potassium, by weight.
  - 2. Multi-Cote All Purpose by Schultz composed of 17 percent nitrogen, 17 percent phosphorous, and 17 percent potassium, by weight.
- C. Deliver fertilizer, mixed as specified, in original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear manufacturer's guaranteed statement of analysis, or manufacturer's certificate of compliance covering analysis shall be furnished to Owner. Store fertilizer in such manner that it shall be kept dry.

## 2.10 MULCH

- A. Straw Mulch: Straw mulch shall not be used for seeding or to stabilize disturbed areas.
- B. Wood Mulch: Wood mulch shall be shredded hardwood bark mulch obtained from a local source harvested in a sustainable manner and salt free and free from deleterious materials and suitable as a top dressing of trees and shrubs. Mulch shall have the characteristics of retaining moisture, forming a mat not susceptible to spreading by

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wind or rain, and providing a suitable growth medium for plants and shall be free of soil, rocks, weeds, sawdust, dirt, garbage, or other debris.

1. Hardwood Mulch: Shredded hardwood mulch shall consist of long fibrous interlocking strands.
2. Color: Natural.

C. Mineral Mulch: Mineral mulch shall consist of decomposed granite, crushed rock, or gravel. Mulch shall be hard, durable stone, washed free of loam, sand, clay, and other foreign substances.

1. Where wood mulch is shown or specified, mineral mulch shall be used where regionally appropriate or where wood mulch is not readily available.
2. Size Range: 3/4 inch maximum 1/4 inch minimum.
3. Color: Readily available natural gravel color range.
4. Pea Gravel: Not allowed.

D. Stone Mulch: Stone mulch shall consist of smooth or tumbled rock, uniform in size. Mulch shall be hard, durable stone, washed free of loam, sand, clay, and other foreign substances.

1. Size range: 3/4 inch minimum, 3 inch maximum.
2. Depth: 4 inches minimum for 3/4 inch to 2 inch stone size, 6 inches minimum for 2.25 inch to 3 inch stone size.
3. Color: As specified on the plans.

E. Softwood Bark Mulch or Pine Needle Mulch is not allowed.

F. Hydro-mulch: Hydra CM Bonded Fiber Matrix shall be used in all hydro-seeding applications. Refer to construction drawings for application rates in various areas.

#### 2.11 TREE STAKING

1. Stakes and Guys: Provide 6' steel "T"-post stakes. Provide wire ties and guys of 2-strand, twisted, pliable galvanized iron wire not lighter than 12 ga. with zinc-coated turnbuckles. Provide not less than 1/2" diameter rubber or plastic hose, cut to required lengths and of uniform color, material and size to protect tree trunks from damage by wires. Provide two (2) stakes per trees under 3" caliper. Provide three (3) stakes per over 3" caliper, alternately, in areas of high pedestrian traffic, deadman stabilizers may be attached to the buried root ball - as detailed.

#### 2.12 WATER

- A. Potable water, hose, and other watering equipment.

#### 2.13 WEED MAT

- A. 4.1 oz., woven polypropylene, needle-punched fabric, weed barrier.

#### 2.14 STEEL EDGING

- A. 1/8-inch x 4-inch interlocking steel edging, staked with metal stakes sufficiently to hold in place and where specifically indicated on the drawings.

#### 2.15 EROSION CONTROL BLANKET

- A. Rolled Erosion Control Products shall have current QDOR™ (Quality Data Oversight and Review) status issued by the Erosion Control Technology Council and shall meet state or agency specific requirements. Evidence of QDOR™ approval shall accompany the product shipped to the job site for ready identification by the contractor or an agency inspector.

## 2.16 WATER-PROOF MEMBRANE

- A. A manufactured hydraulic barrier consisting of a functionally continuous layer of synthetic or partially synthetic, flexible material to restrict, impede, and control seepage of water and contaminants from the planting bed into the expansive soils below shall be Ethylene Propylene Diene Terpolymer Geomembrane (EPDM), 45-mil. thickness, or approved equal.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. If project completion date prohibits in-season planting, prepare for out-of-season seeding or sodding so that lawns shall be completed and ready for acceptance at time of project completion.
- B. Unsuitable Subsoils: Locations containing unsuitable subsoil shall be treated by one or more of the following:
  - 1. Where unsuitability is deemed by Owner to be due to excessive compaction caused by heavy equipment and where natural subsoil is other than AASHTO classification of A6 or A7, loosen such areas with spikes, discing, or other means to loosen soil to condition acceptable to Owner. Loosen soil to minimum depth of 12 inches with additional loosening as required to obtain adequate drainage. Contractor may introduce peat moss, sand, or organic matter into the subsoil to obtain adequate drainage. Such remedial measures shall be considered as incidental, without additional cost to Owner.
  - 2. Where unsuitability is deemed by Owner to be due to presence of boards, mortar, concrete, or other construction materials in sub-grade and where natural subsoil is other than AASHTO classification of A6 or A7, remove debris and objectionable material. Such remedial measures shall be considered as incidental, without additional cost to Owner.
  - 3. Where unsuitability is deemed by Owner to be because natural subsoil falls into AASHTO classification of A6 or A7 and contains moisture in excess of 30 percent, then installation of sub-drainage system or other means described elsewhere in Specifications shall be used. Where such conditions have not been known or revealed prior to planting time and they have not been recognized in preparation of The Drawings and Specifications, then Owner shall issue pricing order to install proper remedial measures.
- C. Unsuitable Topsoil: Locations containing unsuitable topsoil shall be treated by one or more of the following:
  - 1. Where unsuitability is deemed by Owner to be because of presence of objectionable weeds; litter; sods; stiff clay; toxic substances; herbicides or other material which may be harmful to plant growth, then topsoil shall be removed from the site and disposed of in a legal manner.
  - 2. Where unsuitability is deemed by Owner to be because of presence of the stumps, roots; stones larger than 1 inch in diameter; less than 3 percent organic material; low or high pH range, remove objectionable material and amend topsoil to meet the requirements specified in part 2 above. Such remedial measures shall be considered as incidental, without additional cost to Owner.
- D. Acceptable Conditions for Planting Operations:
  - 1. Perform planting operations at steady rate of work unless weather conditions make it impossible to work.
  - 2. No plant material shall be planted in frozen ground.
- E. Membrane –lined Planting Bed Preparation:
  - 1. Excavate area of the membrane –lined planting bed to a minimum depth of 24” or as detailed in the construction documents.
  - 2. Subgrade Preparation: Subgrade preparation shall conform to manufacturer recommendations. Remove any sharp materials, angular stone, roots, etc. that may damage the liner or adversely affect its function. Provide a smooth uniform surface on all vertical and horizontal faces.
  - 3. Cushion: A cushion layer shall be placed beneath the liner if the subgrade particles contain sharp angular stones that could damage the liner or particles greater than 3/8-inch for geomembrane liners and ½-inch for GCL’s. The cushion may be a 10-oz/sq yd or heavier nonwoven geotextile or a layer at least 6 inches thick of soil meeting the particle size and shape requirements of the subgrade. Geotextile cushion material shall

- meet the requirements of GRI Test Method GT12(a). Follow the manufacturer's recommendations for any additional protective measures.
4. All inlets, outlets, utilities, and other appurtenances may be installed before, during, or after the liner placement, but shall be done in a manner that does not damage or impair the proper operation of the liner. Any liner penetrations shall be patched or sealed to provide a fully watertight barrier.
  5. Installation of the flexible membrane shall be in accordance with manufacturer recommendations. All flexible membrane installations shall be certified by the installer or manufacturer as meeting the material and installation requirements of the plans and specifications. Manufacturer recommendations shall be followed with regard to protection from weather and exposure.
  6. Drainage Layer: Within the membrane-lined planting bed is a layer of coarse drainage material and perforated pipe. Line the entire bottom of the planting bed with a non-woven geotextile fabric. Place a min. of 2" of washed gravel or other drainage media in the bottom of the pipe trench. Connect perforated pipe to solid walled pipe within the membrane-lined planting bed. Continue to fill the planting bed until a min 4" layer of drainage material covers the entire bottom. Enclose the min. 4" layer of drainage media with the non-woven geotextile fabric and overlap to provide 100% coverage of the media within the bottom of the planting bed.
  7. Cover Soil: Cover soil shall be placed within 24 hours after placement of the liner to minimize the potential for damage from various sources, including precipitation, wind, and ultra-violet exposure. Place the prepared planting bed mix in 8" lifts and tamp lightly until the planting bed area is completely filled with soil.

F. Tree and Shrub Preparation:

1. Dig bare-rooted shrubs with adequate fibrous roots. Cover roots with uniformly thick coating of mud by being puddled immediately after they are dug, or packed in moist mulch or moss.
2. Dig ball and burlap plants with firm natural balls of earth of diameter and depth to include fibrous roots.
3. Protect roots or balls of plants at all times from sun and drying winds.
4. Ball and burlap plants which cannot be planted immediately upon delivery shall be set on ground and protected with soil, wet moss, or other acceptable material. Heel-in bare rooted plants that cannot be planted immediately upon delivery. All shall be kept moist.
5. Open and separate bundles of plants before roots are covered. Prevent air pockets among roots. During planting operations, cover bare roots with canvas, hay, or other suitable material. Plants shall not be bound with wire or rope which will result in damage to bark or branches.

G. Sod and Seed Bed Preparation:

1. Newly Graded Subgrades:
  - a. Do not place topsoil until subgrade has been approved in accordance with Section 02300.
  - b. Before placing topsoil, rake subsoil surface clear of stones, debris, and roots. Disk, drag, harrow, or hand rake subgrade to depth of 4 inches and remove stones larger than 1-1/2 inches to provide bond for topsoil.
  - c. Spread topsoil to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Adjust depth of topsoil in areas adjacent to paved surfaces or curbs to allow for the placement of sod or seed.
2. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface as follows:
  - a. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
  - b. Disk, drag, or harrow surface soil to a depth of at least 6 inches.
  - c. Remove stones larger than 1-1/2 inch in any dimension and sticks, roots, trash, and other extraneous matter.
  - d. Legally dispose of waste material, including grass, vegetation, and turf.
  - e. Adjust depth of topsoil in areas adjacent to paved surfaces or curbs to allow for the placement of sod or seed.
3. Incorporate soil amendments and commercial fertilizer into the top 4 inches of topsoil to achieve the specified topsoil requirements. Till soil to a homogenous mixture of fine texture.
4. Grade areas to finish grades, filling as needed or removing surplus topsoil. Float areas to smooth, uniform grade as indicated on the Drawings. Lawn areas shall slope to drain.
5. Where no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls, such as walks, curbs, catch basin, steps, or buildings. Roll, scarify, rake, and level as necessary to obtain true, even lawn surfaces. Finish grades shall meet approval of Owner.

6. Sod and seed beds shall be firmed by rolling before seeding begins.

H. Groundcover Bed Preparation:

1. Grade areas to finish grades, filling as needed or removing surplus topsoil. Float areas to smooth, uniform grade as indicated on the Drawings.
2. Set out and space groundcover 12 inches apart maximum or as otherwise indicated on the Drawings.
3. Dig holes large enough to allow spreading of roots, and backfill with planting soil.
4. Remove groundcover from pots.
5. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
6. Water thoroughly after planting taking care not to cover plant crowns with wet soil.
7. Protect plants from hot sun and wind; remove protection when plants show evidence of recovery from transplanting shock.

I. Island Preparation:

1. Excavate compacted soil to a depth of 24 inches or as otherwise indicated on the Drawings.
2. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
3. Scarify sides of excavation pit smeared or smoothed during excavation.
4. Subsoil or topsoil removed from islands shall not be used in planting soil mix.
5. Notify Owner's CEC if subsoil conditions evidence unexpected water seepage or retention within excavation area.
6. Backfill islands in 8 inch lifts with planting soil mix specified herein. Tamp each lift lightly to prevent settling.
7. Grade areas to finish grades, filling as indicated on the Drawings. Float areas to a smooth, uniform grade as indicated on the Drawings.

3.2 PROTECTION

- A. Topsoil which must be transported across finished sidewalks shall be delivered in such manner that no damage will be done to sidewalks.
- B. Before commencing work, trees and shrubs that are to be saved shall be protected from damage by placement of fencing flagged for visibility or some other suitable protective procedure approved by Owner and as shown in the construction Drawings or as required by local code.
- C. Trucks or other equipment shall not be driven or parked within drip line of any tree unless tree overspreads paved area.
- D. Use precautionary measures when performing work around trees, sidewalks, pavements, utilities, and other features either existing or previously installed.
- E. Adjust depth of earthwork and topsoil when working immediately adjacent to aforementioned features in order to prevent disturbing tree roots, undermining sidewalks and pavements, and damage in general to other features either existing or previously installed.
- F. Cover plants transported to project in open vehicles with tarpaulins or other suitable covers securely fastened to body of vehicle to prevent injury to plants. Closed vehicles shall be adequately ventilated to prevent overheating of plants. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage shall be cause for rejection. Plants shall be kept moist, fresh, and protected. Such protection shall encompass entire period during which plants are in transit, being handled, or are in temporary storage.
- G. Plants shall not be delivered to the site more than seven days prior to planting. Plants not planted within 48 hours of delivery, shall be healed in (covered with sawdust, soil or mulch), and the containers or balls protected from wind and temperature and kept moist until planting.

- H. Where excavation, fill, or grading is required within drip line of trees that are to remain, work shall be in accordance with the tree preservation plans and details within the Drawings or as follows. If any discrepancy occurs, detailed Drawings shall take precedents over general specifications::
1. Trenching: When trenching occurs around trees to remain, tree roots shall not be cut but trench shall be tunneled under or around roots by careful hand digging without injury to roots.
  2. Raising Grades:
    - a. Where fill not exceeding 16 inches is required, clean, washed gravel graded from 1 inch to 2 inches in size shall be placed directly around tree trunk. Extend gravel out from trunk on all sides minimum of 18 inches and finish approximately 2 inches above finished grade at tree. Install gravel before any earth fill is placed. New earth fill shall not be left in contact with trunks of trees requiring fill.
    - b. Where fill exceeding 16 inches is required, construct dry-laid tree well around trunk of tree. Tree well shall extend out from trunk on all sides minimum of 3 feet (horizontal) and to 3 inches (vertical) above finish grade. Place coarse-graded rock directly around tree well extending out to drip line of tree. Place clean, washed gravel graded from 1 inch to 2 inches in size directly over coarse rock to depth of 3 inches. Place approved backfill material directly over washed gravel to desired finish grade.
  3. Lowering Grades: Existing trees in areas where new finish grade is to be lowered shall have regrading work done by hand to elevation indicated on The Drawings. Roots as required shall be cut cleanly 3 inches below finished grade and scars covered with tree paint.
  4. Trees marked for preservation that are more than 6 inches above proposed grades shall stand on broad rounded mounds and graded smoothly into lower level. Trees located more than 16 inches above proposed grades shall have dry-laid stone wall or other retaining structure as detailed on The Drawings constructed minimum of 5 feet from trunk. Exposed or broken roots shall be cut clean and covered with topsoil.

### 3.3 PLANTING BED ESTABLISHMENT

- A. Prior to preparing planting beds, the area shall conform to the lines and grades shown on the plans and the condition of the subsoil shall be approved by the Owner.
- B. Contractor shall verify the location of any underground utilities on site.
- C. Planting beds where existing subsoil is determined by Owner to be unsuitable for plant growth in accordance paragraph Unsuitable Subsoil herein shall be excavated to a depth of 24 inches or as needed to provide adequate drainage. Replace excavated soil with planting soil mix.
- D. Planting beds where existing subsoil is determined by Owner/Engineer to be unstable due to moisture considerations and or expansion properties refer to Membrane –lined Planting Bed Preparation herein. Planting bed shall be excavated to a depth of 24 inches or as needed to provide adequate drainage. Prepare planting bed as described in 3.1 E. Membrane –lined Planting Bed Preparation.
- E. Planting beds where existing subsoil is acceptable by Owner shall be prepared as follows:
1. Seven days prior to commencing establishment of the planting areas, apply non selective herbicide. Remove dead vegetation.
  2. Loosen subsoil to a depth of 12 inches. Remove stones larger than 1 inch in any dimension, sticks, roots, rubbish, and other extraneous matter and legally dispose of them off site.
  3. Spread 3 inches of soil conditioner over the surface of the planting area and incorporate into the top 12 inches of the soil. Prior to spreading soil conditioner, add or remove topsoil as needed to accommodate addition of soil conditioner and to achieve finish grade.
  4. Till planting soil mix to a homogenous mixture of fine texture.
  5. Float areas to smooth, uniform grade providing positive drainage out of planting beds and away from structures or as indicated on the Drawings.
- F. Apply slow release fertilizer at a rate of 1-1/2 pounds per 100 square feet for beds areas or per recommendations shown on the Drawings or by local agronomist and incorporate into the top 8 inches.

### 3.4 TREATMENT OF EXISTING TREES

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- A. Prune or remove existing trees as indicated on the planting plan.

### 3.5 TREE AND SHRUB PLANTING

- A. Plants too large for 2 persons to lift in and out of holes shall be placed with sling. Do not rock trees in holes to raise.
- B. If rock or other underground obstruction is encountered, Owner may require plant pits to be relocated, pits enlarged, or plants deleted from project.
- C. Make adjustments in locations as directed. In event that pits or areas for planting are prepared and backfilled with planting soil mix or topsoil to grade prior to commencement of lawn operations, they shall be so marked that when planting proceeds, they can be readily located. In case underground obstructions such as ledges or utilities are encountered, change location under direction of Owner without charge.
- D. All excavations, drainage improvements, and soil replacement in parking islands shall be completed prior to the installation of any trees and shrubs.
- E. Holes for trees shall be at least 2 times the diameter of the root ball and at least 6 inches deeper than root ball or as shown on the Drawings. Holes for shrubs shall be at least 2 times the diameter of the root ball and at least 6 inches deeper than the root ball (minimum) or as shown on the Drawings. Holes for vines shall be at least 12 inches greater in diameter than the spread of root ball at least 12 inches deep.
- F. Remove the top half of wire baskets, the sides of any boxes, or other root ball holding device along the side of the root ball.
- G. Backfill tree holes and shrub beds with planting soil mix. Apply slow release fertilizer at a rate of 1/4 pounds per caliper inch for trees. Incorporate fertilizer into the planting soil mix.
- H. Plants shall be planted at same depth as they had previously grown or as shown on the drawings. Backfill planting soil mix in layers of not more than 8 inches and each layer watered sufficiently to settle before next layer is placed. Tamp planting soil mix under edges of balled plants. Use enough planting soil mix to bring surfaces to finish grade when settled.
  - 1. Provide saucer around each plant as shown on the Drawings.
  - 2. Soak plants with water twice within first 24 hours after time of planting. Apply water with low pressure so as to soak in thoroughly without dislodging topsoil.
- I. Tree Staking: Install Tree Frog Root Ball Tree Staking System as specified on the drawings. In windy conditions, additional staking may be required.

### 3.6 MISCELLANEOUS INSTALLATIONS

- A. Weed Mat: Place weed mat under planting areas that will not be seeded and in any other locations as shown on the Drawings. Cover weed mat with 4 inches of mulch and secure in place with soil staples. NOTE: Weed mat NOT to be installed in areas with spreading ground cover plantings.
- B. Mulch: Place 4 inches of mulch as a top dressing in planting beds. Mulch single trees or shrubs to outside edge of saucer. Type of mulch to be as specified on the drawings and specifications.
- C. Peg sodded slopes between 4:1 and 3:1 to hold in place. Sodded slopes greater than 3:1 are to be reinforced as shown on the drawings.
- D. Areas to be covered with erosion control blankets shall be properly prepared, fertilized, and seeded before blanket is applied. When blanket is unrolled, netting shall be on top and fibers in contact with soil. In ditches, apply blanket in direction of flow of water. On slopes, apply blankets vertically on slope. Overlap ends and sides 6 inches and staple per manufacturer's written instructions.

### 3.7 SEEDING

- A. Do not perform seeding in windy conditions.
- B. Seeding shall be dispersed in 2 directions at right angles to each other.
- C. Permanently seed and mulch cut and fill slopes as construction proceeds to extent considered desirable and practical. In the event it is not practical to seed areas, slopes shall be stabilized with hydro-mulch and tackifier, netting, blankets or other means to reduce the erosive potential of the area.
- D. Slopes that are specified to receive seeding are to be hydro-seeded at the recommended seeding rate prior to installation of the erosion control blanket. After installation of erosion control blankets, the slopes are to have sand spread over the blanket to fill all voids, and then hydro-seeded a second time at the same specified seeding rate.
- E. Surface layer of soil for seeded areas shall be kept moist during germination period. Water seeded areas twice first week to minimum depth of 6 inches with fine spray and once per week thereafter as necessary to supplement natural rain to equivalent of 6 inches depth.

### 3.8 SODDING

- A. Cut and lay sod on same day. Only healthy vigorous growing sod shall be laid.
- B. Lay sod across slope and tightly together to result in solid coverage free of gaps. All seams in sod are to be sanded to provide a smooth uniform growing surface.
- C. Sodded slopes between 4:1 and 3:1 are to be pegged to hold sod in place.
- D. Roll or firmly but lightly tamp new sod with suitable wooden or metal tamper sufficiently to set or press sod into underlying soil.
- E. All finished sodding shall be smooth and free of lumps and depressions.
- F. After sodding has been completed, clean up and thoroughly water newly-sodded areas.

### 3.9 MAINTENANCE DURING CONSTRUCTION

- A. Begin maintenance operations immediately after each plant is planted and continue as required until acceptance. Water, mulch, weed, prune, spray, fertilize, cultivate, and otherwise maintain and protect plants. Reset settled plants to proper grade and position, restore planting saucers, and remove dead, diseased, or unhealthy plant material. Tighten and repair stakes and wires. Correct defective work as soon as possible after it becomes apparent and weather and season permit.
- B. Upon completion of the planting operations, clean up landscaped areas to be free of stones, containers, trash, and other waste and debris to leave area in a neat and well-groomed appearance.
- C. Maintain all plant material in a healthy, vigorous growing condition.
- D. Make weekly inspections to determine moisture content of soil and adjust watering schedule established by irrigation system installer to fit conditions.
- E. After grass growth has started, reseed or sod areas that fail to show uniform stand of grass in accordance with The Drawings and as specified herein. Continue Reseeding and sodding such areas repeatedly until areas are covered with satisfactory growth of grass. Perform removal and replacement or topsoil conditioning if required to facilitate establishment of grass.

- F. Water in such manner and as frequently as is deemed necessary by Owner to assure continued growth of healthy grass. Water areas of site in such a manner as to prevent erosion due to excessive quantities applied over small areas and to avoid damage to finished surface due to watering equipment.
- G. Provide water for execution and maintenance at no expense to Owner. Furnish portable tanks, pumps, hose, pipe, connections, nozzles, and any other equipment required to transport water from available outlets and apply it to seeded areas in approved manner.
- H. Remove heavy cuttings to prevent destruction of underlying turf. If weeds or other undesirable vegetation threaten to smother planted species, such vegetation shall be mowed or, in case of rank growths, shall be uprooted, raked and removed from area by methods approved by Owner.
- I. Remove weeds and other undesirable vegetation by applying herbicides as recommended by the manufacturer or by uprooting. Rake and remove uprooted vegetation from area by methods approved by Owner.
- J. Protect seeded area from pedestrian or vehicular trespassing while grass is germinating. Provide fences, signs, barriers, or other necessary temporary protective devices. Repair damage resulting from trespass, erosion, wash-out, settlement, or other causes.
- K. Remove fences, signs, barriers, or other temporary protective devices after final acceptance.
- L. Remove and replace diseased, distressed, dead, or rejected plants prior to Substantial Completion Date.
- M. Replacements shall be plants of same variety and size specified on The Drawings. Furnish and plant as specified herein. Replacements resulting from removal, loss, or damage due to occupancy of project in any part, vandalism, physical damage by animals, vehicles, etc., and losses due to curtailment of water by local authorities will be approved and paid for by Owner.
- N. Grassed areas damaged during process of work shall be restored or repaired to condition satisfactory to the Owner. Fill, grade, re-fertilize, replant, or mulch as required to restore to contract requirements.

### 3.10 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor as necessary to assure compliance with Contract requirements.
- B. Contractor shall retain an independent soil testing laboratory to sample and test topsoil.
  - 1. Topsoil Analysis: Collect 5 random samples from the topsoil areas. Combine samples and test as a composite for percentages of organic matter; presence of herbicides; percentage of sand, silt, and clay content; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
  - 2. Submit topsoil test reports to Owner's Civil Engineering Consultant (CEC) minimum 6 weeks prior to placement of topsoil.

END OF SECTION