

SOIL AND DISPOSAL FACILITY PROJECT

**TECHNICAL SPECIFICATIONS
FOR SITE EXCAVATION**

PREPARED FOR

FLUOR FERNALD
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

DOCUMENT NO. 20800-TS-0001

**INFORMATION
ONLY**

CONSTR. CONTRACT NO. FSC 642
ENGR. CONTRACT NO. 98PC001323
TASK ORDER L-010

LOCKWOOD GREENE

ENGINEERING CONSULTANTS

1201 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831-3562
Project No. 008919.01

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Date: 03/31/00
Rev. J

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LOCKWOOD GREENE
ENGINEERING & CONSTRUCTION SERVICES

1201 Oak Ridge Turnpike
Oak Ridge, Tennessee 37831-3562
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ISSUED FOR 90% EPA REVIEW
31 MARCH 2000

PREPARED BY:

LD Gtth

APPROVED BY:

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SITE WORK

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Date: 03/31/00
Rev. J

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SECTION 02150
TRAFFIC CONTROL

PART 1 GENERAL

1.1 SCOPE

- A. This Section includes the traffic control requirements for the excavation areas, Special Materials Transfer Area (SMTA), Stockpile 7 (SP7) and movement between the following: On-Site Disposal Facility (OSDF), OSDF Material Transfer Area (OMTA), OSDF borrow area, and designated project operational limits. (Requirements for traffic control within the OSDF and OSDF borrow area are contained in the IMPP and the OSDF Borrow Area Management and Restoration Work Plan.)

1.2 RELATED SECTIONS AND DOCUMENTS

- A. Section 02200 – Earthwork.
- B. Section 02205 – Impacted Material Excavation.
- C. Part 6 - Statement of Work.
- D. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. Manual of Uniform Traffic Control Devices (MUTCD) for Streets and Highways, current edition.
- B. State of Ohio, Department of Transportation (ODOT): Construction and Material Specifications, current edition.

1.4 SUBMITTALS

- A. Submit a Traffic Control Plan to include the following requirements, at a minimum:
 1. Planned traffic routes for hauling all types of excavated impacted material from the excavation areas to the SMTA, OSDF, SP7, Soil Treatment Area, or other designated areas.
 2. Planned traffic routes for hauling material from OMTA to OSDF, OSDF borrow area to OSDF, and miscellaneous stockpiles to OSDF.
 3. Entering haul roads from the excavation areas.
 4. Safe movement of personnel and equipment within the excavation boundary.
 5. Traffic crossings over below grade utilities that are energized or active (e.g., gas lines, drinking water lines, electrical lines, and storm sewer).
 6. Designated pedestrian and equipment crossings.

7. Maintenance and cleaning of the Impacted Material Haul Road, planned traffic routes, pedestrian crossings, and equipment crossings.
8. Coordination with other site traffic.
9. Access control to and from radiological-control and certified areas.
10. Location of traffic signals, signs, and other methods or devices used for traffic control, including dedicated flaggers and spotters.
11. Monitoring and enforcement of speed limits within active work areas, support areas, and on haul roads.
12. Use of gates to restrict traffic access.
13. Entry and exit routes for all types of traffic activity (material delivery, fueling, equipment movement, and similar traffic activity).

1.5 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements as required in Part 8.
- B. Dust control shall be in accordance with Part 6.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide materials for traffic control, including stop and yield signs, as defined by the Traffic Control Plan and conforms to MUTCD and ODOT specifications.
- B. Provide fencing as specified in Section 02200.

PART 3 EXECUTION

3.1 TRAFFIC CONTROL

- A. Control traffic in accordance with the approved Traffic Control Plan.
- B. Supply, install, and maintain traffic control devices.
- C. Maintain speed limit of construction vehicles and equipment as required in Part 6.
- D. Ensure that haul equipment or other equipment traveling between certified and non-certified areas, as shown on construction drawings, remains on roads constructed of certified material. Perform wheel-wash activities and decontamination in accordance with requirements defined in Part 8. The Construction Manager will perform radiological monitoring in accordance with Section 02205.

- E. Identify entry points to the excavation area as part of the Traffic Control Plan. Provide entry points free of interference from non-project operations. Ensure that traffic entering haul roads yields to traffic already on the road.

3.2 IMPACTED MATERIAL HAUL ROAD

- A. Control the Impacted Material Haul Road (IMHR) as a contamination area during excavation and hauling of above-WAC materials. The Construction Manager must approve all IMHR crossings from control areas.
- B. The Construction Manager may post or reclassify road crossing intersections with the IMHR during periods of inactivity.

3.3 UTILITY CROSSINGS

- A. Protect all energized or active utility lines outside of existing paved areas, as shown on the Construction Drawings, that intersect proposed traffic routes. Use a 1 inch thick steel plate or an equivalent alternative. Provide length and width of steel plates as required to protect the existing utilities. Provide calculations to support equivalent alternatives.

3.4 EQUIPMENT PARKING

- A. OSDF Contractor Administration Area
 1. Provide clean equipment parking areas within the OSDF Contractor Administration Area.
 2. Restrict personal vehicles from the clean equipment parking areas.
 3. Provide personnel parking at the OSDF Contractor Administration Area.
- B. Contaminated Equipment Parking Area
 1. Locate the contaminated equipment parking area in close proximity to the Radiological Control Point Facility.
 2. Maintain contaminated equipment parking areas free of mud, debris and standing water.
 3. Park contaminated equipment utilized in the SP7 area, above-WAC areas, or RCRA characteristic area at the boundary of the area, in accordance with Section 02205, until decontaminated and released from the area.

3.5 BORROW AREA HAUL ROAD

- A. Install stop signs to create a four-way stop intersection where the Borrow Area Haul Road crosses the North Access Road, prior to hauling of borrow material.

END OF SECTION

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SECTION 02205
IMPACTED MATERIAL EXCAVATION

PART 1 GENERAL

1.1 SCOPE

- A. This Section includes the requirements for excavating, size-reducing, segregating, stockpiling, loading, hauling, and unloading impacted material. Activities include, but are not limited to, the following:
1. Excavation of all impacted materials to the design surface.
 2. Segregation of impacted materials for disposition or reuse.
 3. Size reduction of remaining structures, utilities, miscellaneous debris and other materials.
 4. Loading, hauling and unloading of all impacted materials to the appropriate disposition.
 5. Development and maintenance of project stockpiles.
 6. Support of site monitoring and sampling activities.
 7. Performance of area management activities.
 8. Excavation of supplemental materials located beyond the design surface.

1.2 RELATED SECTIONS AND DOCUMENTS

- A. Section 02100 – Surveying.
- B. Section 02150 – Traffic Control
- C. Section 02200 – Earthwork
- D. Section 02206 – Earthwork for Remediation.
- E. Section 02207 – Area Isolation Trenching.
- F. Section 02210 – Asbestos Containing Material (ACM).
- G. Section 02216 – Above-WAC Waste Containerization.
- H. Section 02230 – Road Construction.
- I. Section 02275 – Erosion and Sediment Control and Surface Water Management.
- J. Section 02930 – Vegetation.
- K. Part 6 - Statement of Work.
- L. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. Impacted Materials Placement Plan (IMPP), On Site Disposal Facility (OSDF), 20100-PL-007, current revision.
- B. Waste Acceptance Criteria (WAC) Attainment Plan for On Site Disposal Facility (OSDF), 20100-PL-0007, current revision.
- C. Title 29, Code of Federal Regulations (CFR): 29 CFR 1926.650 Subpart P – Excavation, current edition.
- D. Environmental Protection Agency (EPA) Paint Filter Test, EPA SW 846 Method 9095 Paint Filter Test.

1.4 DEFINITIONS

- A. Active Stockpile: A stockpile specifically designed to operate for longer than 45 calendar days. This includes interim stockpiles that are older than 45 days and existing stockpiles as shown on the Drawings.
- B. Debris: Impacted material that is generated during the excavation and removal of building structures, utilities, miscellaneous man-made materials, and natural materials. These materials include floor slabs; foundation walls; foundations; piers; footings; hydraulic ram casings; structural steel and miscellaneous metal; electrical duct-bank, manholes, electrical wiring, and power poles; remaining equipment and miscellaneous mechanical items; chain link and other fencing; agricultural drain tiles; and rock, asphaltic pavement, and other aggregate materials not defined as Special Materials.
- C. Design Surface: Excavated surface created when the Contractor excavates impacted material to the lines and grades shown on the Drawings.
- D. Final Remediation Levels (FRLs): The permissible concentration of contaminants that can remain in site soil and sediment following completion of remedial actions.
- E. Hazardous Waste Management Unit (HWMU): Area shown on the Drawings that has contained hazardous or mixed waste.
- F. Impacted Material: Soil with contamination levels above the established FRLs or man-made materials. Impacted materials associated with the Project are presented in Table 02205-1.
- G. Interim Stockpile: An impacted material stockpile within the project boundary, that is intended to be dispositioned in less than 45 calendar days.
- H. Special Materials: Impacted material requiring special handling as specified in this Section and presented in Table 02205-1.
- I. Supplemental Excavation: Removal of impacted material encountered beyond the design surface.
- J. Underground Storage Tank (UST): Tank that was used to contain an accumulation of a regulated substance, of which the volume was 10 percent or more beneath the surface of the ground.

- K. WAC: Waste acceptance criteria (WAC) for disposition of material at the OSDF as defined by the WAC Attainment Plan. This WAC includes radiological/chemical criteria for soil, physical criteria for debris, and criteria for ancillary remediation waste (i.e., analytical sample residue returns, PPE).

1.5 SUBMITTALS

- A. Submit an Excavation Work Plan, as required in Part 6 and Part 8, to include the following:

1. Technical approach, including equipment by size and type, for the execution and management of excavation, segregation, size reduction, loading, hauling and unloading, project stockpiling, monitoring, supplemental material excavation, and area management activities, for the following material types:
 - a. Below-WAC.
 - b. Above-WAC.
 - c. RCRA Hazardous.
 - d. Special Materials.
 - e. HWMU.
 - f. UST.
 - g. Soil treated by others in the Soil Treatment Area.
2. Technical approach, including equipment by size and type, for the demolition and removal of remaining structures (i.e. building foundations, slabs, sumps, monitoring wells, piers, hydraulic ram casings) located above the design surface. Methods shall address safe sequencing and stabilization of remaining structures during demolition and removal.
3. Technical approach, including equipment by size and type, for excavation of utilities located above and below the design surface.
4. Technical approach and methods for general area management and administrative control activities including:
 - a. Surveying.
 - b. Inclement weather operations.
 - c. Fencing.
 - d. Spreading, grading, and compaction.
 - e. Maintenance of surface conditions and slope stability.
 - f. Coordination of excavation activities with surface water management and erosion and sediment control measures.
 - g. Temporary shutdown and work stoppage.
 - h. Equipment decontamination and contamination control at project boundaries.
 - i. Haul road management.
 - j. Earthwork for remediation in accordance with Section 02206.
 - k. Material tracking and documentation.
 - l. Maintenance and fueling of equipment.
 - m. Coordination of dust control.
 - n. Seasonal shutdown.
 - o. Installation of precertification boundaries.

5. Technical approach, including equipment by size and type, for de-watering saturated soil and sediment, including methods for de-watering and water control. Describe specific methods for de-watering soils and pumping water contaminated with volatile organic compounds (VOCs) in accordance with Section 02275.
6. Technical approach, including equipment by size and type, for removal of Above-WAC and RCRA hazardous soil and process-related residue from piping and debris, including methods to control and collect contaminated wash water. The technical approach shall establish a process to remove the residue and soil to allow the piping and debris to be placed in the OSDF.
7. Technical approach for management of soil from areas requiring treatment at the Soil Treatment Area shown on the Drawings prior to disposition. The technical approach shall address management of the Soil Treatment Area.
8. Technical approach for protecting the Great Miami Aquifer (GMA) from infiltration of contaminated soil and water during removal of structures and/or impacted soils within 5 feet of the GMA, and installation of GMA plugs, in accordance with Section 02206.
9. Technical approach for establishing and maintaining haul routes and ramps located within deep excavations, including maximum slope, minimum curve radius, and road width.
10. Technical approach for size reducing concrete and asphalt for temporary aggregate surfaces and/or to provide supplemental Category 1 material. Include technical approach for managing the area for size reduction activities.
11. Technical approach for managing Stockpile 7 (SP7), including:
 - a. Inclement weather operations.
 - b. Spreading, grading, and compaction.
 - c. Management of surface conditions and drainage.
 - d. Temporary shutdown and work stoppage.
 - e. Methods to prevent contamination of haul equipment tires.
 - f. Plan and details showing the unloading of Above-WAC impacted material at SP7.

1.6 VERIFICATION OF THE EXISTING CONDITIONS

- A. Verify existing conditions in accordance with Section 02100.

1.7 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental Health and Safety, and Training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide fencing materials in accordance with Section 02200.
- B. Provide 3/8-inch yellow nylon rope fence.

- C. Provide 20-mil sheets of Herculite or equal for use in buffer areas.

2.2 EQUIPMENT

- A. Furnish and maintain equipment to perform required operations in conformance with these specifications and in accordance with Part 8.
- B. Equipment used to haul impacted material over the existing paved IMHR, shall be equal to or less than the gross vehicle weight and axle loading for a Caterpillar CAT D300E haul truck (gross vehicle weight of 120,000 pounds and maximum axle width of 9-feet 10-inches). Pavement width of the existing two-way IMHR is 24-feet. Select equipment and equipment width to ensure safe operation on this road.
- C. Equipment used within the excavation area shall be equal or less than the gross weight for a Caterpillar CAT 350L track hoe (112,500 pounds). However, the Construction Manager may approve the use of heavier equipment in this area provided the Contractor submits calculations certified by a registered Professional Engineer, as part of the Excavation Work Plan, that ensure slope stability.
- D. Equipment used to excavate, load, haul, and unload impacted materials shall have enclosed cabs. Enclosed cab is defined as an equipment cab isolated from outside environment (intact windows, doors, panels and floors surrounding driver with all windows and doors shut) which provides a barrier from intrusion of outside airborne particles. Any heating, ventilating, or air conditioning units associated with the equipment cab must not provide a direct path for outside air to enter (air conditioner on air recirculate mode) unless the air is first passed through a high efficiency particulate air filter pulled directly from outside the cab.
- E. Furnish placards, placard carriers and 3-inch nominal diameter mounted sealable polyvinyl-chloride (PVC) tubes to serve as manifest carriers on all haul trucks. Install at locations as directed by the Construction Manager.
- F. Assign equipment used to haul material to the OSDF with unique alpha-numeric identifiers. This identifier shall be placed on both sides of the truck cab and shall be visible from 10 feet.
- G. Equip trucks used for hauling of the impacted material with automatic load cover tops or employ Best Available Technology (BAT) methods to ensure that no airborne materials are emitted from the haul truck bed or load, whether empty or full.
- H. Provide water tank trucks, water wagons, hydroseeders, portable tanks, pressure distributors, piping, sprinklers or other equipment designed to apply water and/or dust suppressant and crusting agent uniformly and in controlled quantities to variable surface widths to provide fugitive dust control as required in Part 6.
- I. Provide pressure wash or comparable equipment as approved by the Construction Manager to clean visible process residue and soil from piping and debris to allow the piping and debris to be placed in the OSDF.
- J. Provide portable wash equipment to wash vehicle tires and vehicle exteriors as necessary.

- K. Equipment used for size reducing concrete and asphalt materials shall be capable of processing debris to the size requirements of Category 1 material. In addition equipment will be equipped to remove rebar and other miscellaneous imbedded metals and provide mitigation of fugitive dust release.

PART 3 EXECUTION

3.1 GENERAL

- A. Prior to performing any excavation activities, satisfy the following requirements:
 - 1. Complete preliminary survey and layout work in accordance with Section 02100.
 - 2. Establish dust control methods in accordance with the Contractor's approved Dust Control Plan.
 - 3. Complete area isolation trenching around the excavation boundary in accordance with the Drawings and Section 02207.
 - 4. Complete construction of the Tank Farm Settling Basin as shown on the Drawings.
- B. Install, modify, and manage construction and radiological control boundary fence, including installation of construction area signs specified in Part 8, as shown on Drawings. Radiological control and certified area signs will be furnished and installed by the Construction Manager.
- C. Install and manage surface water management and erosion and sediment control measures in accordance with Section 02275.
- D. Install and manage traffic control devices in accordance with Section 02150.
- E. Establish and manage SMTA(s) as follows:
 - 1. Establish the Special Materials Transfer Area (SMTA) adjacent to the project boundary so that it is accessible from the excavation area and the Former Production Area. Use areas designated on the Drawings or an existing building slab, paved parking area, or new aggregate surface as approved by the Construction Manager.
 - 2. Construct ingress/egress to the SMTA, including access roads, ramps, and drainage improvements as required.
 - 3. Install new aggregate surface SMTA in accordance with the Drawings and Section 02230, and provide positive drainage.
 - 4. The SMTA shall not be used as a Contractor laydown area.
 - 5. The SMTA shall be controlled as a radiological buffer area in accordance with this Section and Part 8.
- F. Establish and manage the Soil Treatment Area shown on the Drawings as follows:
 - 1. Install surface water run-on/run-off controls to minimize water within the area in accordance with Section 02275.
 - 2. Establish methods for collection of water from within the area in accordance with Section 02275.
 - 3. Install T-posts and rope fence immediately around the Soil Treatment Area to control access.
 - 4. Maintain the unloading area such that haul equipment tires are prevented from coming in contact with the soil in the treatment area.

5. Do not remove equipment or material used to place and manage material in the treatment area without the approval of the Construction Manager. Do not remove equipment from the area until decontamination activities have been completed and the Construction Manager has performed a visual inspection of equipment for release. Wash the truck bed within the treatment area, as directed by the Construction Manager.

- G. Perform fracturing of concrete slabs as part of initial excavation activities. Excavate fractured materials concurrent with the adjacent Above-WAC or Below-WAC material. Fracturing of at-grade concrete slabs may continue concurrently with Above-WAC and/or RCRA hazardous soil removal, but concrete outside of Above-WAC and RCRA Hazardous areas shall not be removed until Above-WAC and RCRA hazardous soil removal has been completed, unless otherwise approved by the Construction Manager.

- H. Establish controls for removal of ACM in accordance with Section 02210.

- I. Stockpile concrete materials as necessary to facilitate the generation of Category 1 material in accordance with this Section or as directed by the Construction Manager.

- J. Blasting, including use of explosives or explosive devices, is not permitted.

- K. Unless otherwise noted on the Drawings, the following slope stability requirements shall apply during excavation activities:
 1. Excavation slopes with depths less than 20-feet shall be performed in accordance with applicable Occupational Safety and Health Administration (OSHA) guidelines.
 2. Temporary excavation slopes with depths greater than 20-feet shall be no steeper than 1.5H:1V with a maximum height of 13 feet between 15 foot benches.
 3. Design slopes and slopes created by supplemental excavation shall be no steeper than 2H:1V with a maximum height of 13 feet between 15 foot benches.

- L. Protective systems for trenching and excavation activities shall comply with OSHA 29 CFR 1926.650 Subpart P.

- M. Remove material adjacent to structures that extend above the excavation surface, as well as the structures themselves, in a safe manner to ensure that an unstable condition is not created.

- N. The following additional requirements shall apply to equipment for excavation, loading, hauling, and unloading:
 1. Dedicate and restrict equipment required to excavate, load, haul and place Above-WAC and RCRA hazardous material, as well as soil requiring treatment, to that specific use until decontamination has been completed and approved by the Construction Manager. Upon approval by the Construction Manager that no visible material is present on exterior equipment surfaces, or in haul truck beds, equipment may be used elsewhere.
 2. Prohibit tracked equipment from hauling, operating, or tracking over the Impacted Material Haul Road (IMHR) or other paved roadways, unless otherwise approved by the Construction Manager.
 3. Maintain equipment within the excavation area during periods of non-work (evenings, weekends, and holidays) unless equipment decontamination has been completed and the Construction Manager has approved the equipment removal.

4. Complete decontamination activities and request a radiological survey of the equipment by the Construction Manager prior to moving equipment out of radiological contamination areas.
- O. Perform intermediate and final surveys as specified in Section 02100 for measurement and periodic progress payment and to confirm attainment of the design surface.

3.2 GENERAL EXCAVATION

- A. Excavate impacted materials in accordance with the Contractor's approved Excavation Work Plan.
- B. Excavate and load material in such a manner that enables the Construction Manager to visually observe all excavation and loading operations as required to accurately manifest material for disposition.
- C. Excavations shall generally proceed in an up-gradient to down-gradient pattern to the lines and grades shown on the Drawings, unless otherwise directed by the Construction Manager.
- D. Keep excavation equipment in contaminated areas to prevent recontamination of areas excavated to final grade. Excavate an area by methods that prevent drainage of surface water into the area.
- E. Unless otherwise noted on the Drawings or directed by the Construction Manager, excavate material from Above-WAC and RCRA hazardous areas and soil requiring treatment identified on the Drawings in accordance with this Section, prior to excavating any Below-WAC material.
- F. Survey and stake excavation areas as shown on the Drawings, in accordance with Section 02100.
- G. Establish excavation boundary and buffer area controls for Above-WAC areas, RCRA Hazardous areas, HWMUs, and areas containing soil requiring treatment shown on the Drawings. The Construction Manager will administratively maintain buffer areas.
 1. Establish excavation area boundaries at surveyed and staked locations, in accordance with this Section, unless otherwise directed by the Construction Manager.
 2. Install T-posts and rope fence at the excavation boundary.
 3. Establish the buffer area adjacent to the excavation area to serve as a controlled loading area between the excavation area and the surrounding radiological controlled area.
 4. Grade the buffer area to drain into the excavation.
 5. Install T-posts and rope fence around the buffer area as directed by the Construction Manager.
 6. Cover the buffer area with a 20-mil sheet of Herculite, or equivalent, as directed by the Construction Manager.
 7. Collect water encountered during excavation and pump to the Tank Farm Settling Basin as specified in Section 02275.
 8. Keep the buffer area clean and free of dirt and mud.
 9. Remove spillage before releasing haul equipment from the buffer area.
- H. Load haul equipment by reaching over the excavation area boundary and dumping directly into haul equipment located in the buffer area. Load haul equipment in a manner that prevents spillage and accumulation of material on the wheels and components of the haul equipment. Remove all visible

material that accumulates on the exterior of the truck. Multiple loading areas may be established within the buffer area, as approved by the Construction Manager.

- I. If the Construction Manager identifies radiological contamination on the exterior of haul equipment, wash the equipment within the buffer area (with low volume, high-pressure washer or approved equivalent).
- J. Prior to excavating the backfilled Area 3A isolation trench, located as shown on the Drawings, physical sampling by the Construction Manager is required in locations where sanitary lines were cut during trenching. Allow 10 working days for physical sampling and analysis by the Construction Manager.
- K. Excavate all known utilities as indicated on the Drawings. Prior to removal, cap, drain, purge and/or plug utility lines to be excavated. Stop work, prevent release of material into surrounding soil, and notify the Construction Manager if hold-up material is encountered in utility lines.
- L. Stop excavation and immediately notify the Construction Manager if unidentified utilities or underground structures (tanks) are encountered.
- M. Piping that is deformed, closed or otherwise hinders visual inspection shall be managed as Above-WAC debris.
- N. If a utility is suspected of containing ACM, notify the Construction Manager and manage in accordance with Section 02210.
- O. Excavate, size-reduce, and handle piping and debris in such a manner to minimize the generation of Above-WAC debris or friable asbestos.
- P. Take precautions as excavation approaches the GMA elevation shown on the Drawings. Stop excavation activities in the area and immediately notify the Construction Manager if sands and gravel are encountered, even if the design surface has not been reached. Backfill and protect the GMA in accordance with Section 02206.
- Q. Maintain tolerances of 6 inches below grade for design grades shown on the Drawings, or as directed by the Construction Manager.
- R. In the event a historic, prehistoric, or archeological site, feature, or object is discovered, stop excavation in the area and immediately notify the Construction Manager.
- S. Continuously observe excavations for Special Materials or change in materials. In the event a Special Material or change in materials is encountered, stop excavation in the area and immediately notify the Construction Manager. Dispose of Special Materials in accordance with Table 02205-1 and as directed by the Construction Manager.
- T. In the event solvent saturated soils are encountered, stop excavation in the area and immediately notify the Construction Manager. Containerize or stockpile the soil in a controlled storage area as directed by the Construction Manager.

- U. In the event monitoring wells are encountered, stop excavation in the area and immediately notify the Construction Manager.
- V. Prevent damage to any adjacent structures, materials, and equipment, including utilities that are to remain, or those installed for performance of this work. If damage occurs due to the Contractor's work, Contractor shall repair damage at no additional cost to Fluor Fernald.
- W. Disposition impacted material in accordance with this Section. Table 02205-1 provides guidance for the disposition of materials that may be encountered which will be disposed at the 3 destinations identified in this Section. Notify the Construction Manager in the event that materials are discovered that do not appear to be represented in Table 02205-1. The Construction Manager will provide oversight of material movement to ensure compliance with this Section. The Construction Manager may require the Contractor to remove soil from piping and debris to facilitate visual inspection.
- X. OSDF disposition requires the following:
 1. Comply with requirements stated in the WAC Attainment Plan and the IMPP.
 2. Clean process-related residue from all piping and debris in accordance with the Contractor's approved Excavation Work Plan. Notify the Construction Manager of residue that is not readily removed and manage the debris as directed.
 3. Comply with criteria identified in Table 02205-1 for disposition of Special Materials at the OSDF.
 4. Remove, package, load and haul ACM in accordance with Section 02210.
- Y. SP7 disposition requires the following:
 1. Soil, piping and debris exceeds the requirements for OSDF disposition as outlined in Table 02205-1.
 2. Piping and debris shall be less than 10 inches in at least one dimension, and no longer than 8 feet in any dimension.
- Z. SMTA disposition requires the following:
 1. Soil, piping and debris exceeds the requirements for OSDF and SP7 disposition as outlined in Table 02205-1.
 2. All materials shall be containerized in accordance with Section 02216.
 3. Loaded containers shall be placed in the SMTA in a manner that protects the containers from damage. Do not stack containers.

3.3 ABOVE-WAC EXCAVATIONS

Excavate Above-WAC material to the limits shown on the Drawings as follows:

- A. Remove debris (concrete, asphalt, and miscellaneous structures) from Above-WAC areas and pressure wash the debris to remove any soil/residue. The Construction Manager will visually monitor washing operations to ensure that debris is free of all soil/residue and approved for loading and hauling to the

OSDF. The Construction Manager may require additional washing as necessary to satisfy visual inspection.

- B. Debris from Above-WAC areas not approved for disposal at the OSDF shall be dispositioned at SP7 in accordance with this Section.
- C. Excavate soil/gravel in 3+/-1 foot lifts, or as directed by the Construction Manager, to the design surface, as shown on the Drawings. Load and haul material to SP7 in accordance with this Section,
- D. After excavating a lift within an Above-WAC area, excavate the surrounding impacted material to a depth of at least 1 foot above the excavated bottom of the Above-WAC excavation area. Except for the buffer area, grade the surrounding area to drain away from the Above-WAC excavation.
- E. If initial depth of Above-WAC material is below the existing surface, excavate Below-WAC material in 2+/-1 foot lifts until Above-WAC material has been reached, then proceed in 3+/-1 foot lifts, or as directed by the Construction Manager.
- F. The Construction Manager will perform real-time monitoring upon removal of each lift and upon achieving the limits of the Above-WAC area shown on the Drawings. In Above-WAC areas contaminated with Tc-99, as shown on the Drawings, the Construction Manager will perform physical sampling at the design depth. Allow 10 working days for sampling and analysis. Do not proceed with further excavation in this area until directed by the Construction Manager.
- G. Perform additional Above-WAC excavations, as directed by the Construction Manager, if monitoring or analysis identifies additional Above-WAC material beyond the limits shown on the Drawings.

3.4 RCRA HAZARDOUS EXCAVATIONS

Excavate RCRA Hazardous areas to the limits shown on the Drawings as follows:

- A. Remove debris (concrete, asphalt, and miscellaneous structures) from RCRA hazardous areas and pressure wash the debris to remove any soil/residue. The Construction Manager will visually monitor washing operations to ensure that debris is free of all soil/residue and approved for loading and hauling to the OSDF. The Construction Manager may require additional washing as necessary to satisfy visual inspection.
- B. Debris from RCRA hazardous areas not approved for disposal at the OSDF shall be staged at the Soil Treatment Area as shown on the Drawings.
- C. Excavate material from RCRA hazardous areas to the limits shown on the Drawing. Load and haul material to the Soil Treatment Area shown on the Drawings for treatment by others. Do not proceed with further excavation in this area until directed by the Construction Manager.
- D. The Construction Manager will perform physical sampling upon confirmation that all RCRA hazardous material has been excavated. Allow 10 working days for sampling and analysis.
- E. Perform additional RCRA hazardous excavations, as directed by the Construction Manager, if analysis identifies additional RCRA hazardous material beyond the limits shown on the Drawings.

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3.5 UST EXCAVATIONS

Excavate USTs and areas that previously contained USTs shown on the Drawings, as well as USTs discovered during excavation, as follows:

- A. Excavate to expose the top of tank shown the Drawings to allow the Construction Manager to assess the tank's condition.
- B. The Construction Manager will measure the amount of liquid/sludge remaining in tank as necessary.
- C. If more than 1 inch of liquid remains in the bottom of the tank or more than 0.3% by weight of the total container capacity remains in the container, proceed as follows:
 - 1. Pump remaining tank contents into drums provided by the Construction Manager.
 - 2. Move filled drums from the excavation area to the SMTA as directed by the Construction Manager.
 - 3. The Construction Manager will remove the drums from the SMTA for appropriate disposition.
- D. Upon confirmation from the Construction Manager that the tank is empty, as determined by the criteria stated above, excavate the tank with oversight by the Construction Manager. Ensure that water does not accumulate in the tank from the surrounding excavation.
- E. Size-reduce the tank to meet WAC.
- F. Over-excavate soil surrounding UST excavations and from areas that previously contained USTs to remove any visible stains and as directed by the Construction Manager.
- G. During excavation, stage the size-reduced tank, soil excavated from around the UST, and soil excavated from areas that previously contained USTs separate from other excavated materials. Dispose of the tank and excavated soil in the OSDF as a discrete waste stream.

3.6 HWMU EXCAVATIONS

Excavate material from the HWMU to the limits shown on the Drawings as follows:

- A. Remove debris (concrete, asphalt, and miscellaneous structures) from the HWMU. If the HWMU is also considered an Above-WAC area, pressure wash the debris to remove any soil/residue. The Construction Manager will visually monitor washing operations to ensure that debris is free of all soil/residue and approved for loading and hauling to the OSDF. The Construction Manager may require additional washing as necessary to satisfy visual inspection.
- B. Excavate material from the HWMU to the limits shown on the Drawing.
- C. Dispose of excavated HWMU material in the OSDF as a discrete waste stream.
- D. The Construction Manager will perform physical sampling upon confirmation that all HWMU material has been removed. Allow 10 working days for sampling and analysis. Do not proceed with further excavation in this area until directed by the Construction Manager.

- E. Perform additional excavations within the HWMU, as directed by the Construction Manager, if monitoring and analysis identifies additional HWMU material beyond the limits shown on the Drawings.

3.7 BELOW-WAC EXCAVATIONS

Excavate Below-WAC material to the limits shown on the Drawings as follows:

- A. Remove slabs, concrete pads, asphalt, gravel, base and sub-base to sub-grade soil within Below-WAC areas. Load and haul this material to the North OMTA, located north of the IMHR as shown on Drawings, or to the OSDF, as directed by the Construction Manager. Notify the Construction Manager for real-time monitoring prior to subsequent excavation in the Below-WAC area.
- B. At a minimum, excavate surface material from Below-WAC areas to a depth of 2 feet, based on preliminary surveys specified in Section 02100.
- C. Perform subsequent excavations in 3+/-1 foot lifts, or as directed by the Construction Manager, to achieve the design surface shown on the Drawings. Load and haul material to the OSDF in accordance with this Section.
- D. Upon reaching the design surface, notify the Construction Manager for real-time monitoring.

3.8 REMOVING SOIL FROM THE SOIL TREATMENT AREA

Pending notification from the Construction Manager of the results of treatment by others, remove material from the Soil Treatment Area as follows:

- A. As directed by the Construction Manager, load and haul material that passed treatment and is Below-WAC to the OSDF.
- B. As directed by the Construction Manager, load and haul material that passed treatment but is Above-WAC to a separate designated stockpile location within SP7. Install rope fencing around this stockpile to separate it from the rest of SP7.
- C. As directed by the Construction Manager, containerize material that failed treatment using containers provided by the Construction Manager as follows:
 - 1. Establish a buffer area adjacent to the Soil Treatment Area in accordance with this Section, as directed by the Construction Manager.
 - 2. Load material into containers located in the buffer area in accordance with Section 02216.

3.9 MATERIAL SEGREGATION

- A. During excavation, segregate materials by the impacted material categories as defined in the IMPP. Maximize the volume of Category 1 material. The Construction Manager shall provide direction for any deviations in segregation.

- B. Segregate all Below-WAC material to support construction of the four zones of each OSDF cell (protective layer, select impacted material layer, impacted material layer, and contouring layer).
- C. Segregate existing surface aggregate material and size-reduced concrete and asphalt materials for use as temporary aggregate material in accordance with the Drawings.

3.10 SIZE REDUCTION

- A. Size-reduce remaining structures (i.e., building foundations, slabs, sumps, hydraulic ram casings) located above the design surface to meet the physical WAC for OSDF.
- B. Size-reduce concrete and asphalt structures (i.e., building slabs, concrete/asphalt pads, roads, parking areas) to maximize the generation of material for temporary aggregate surfaces.
- C. Size-reduce concrete and asphalt structures (i.e., building slabs, concrete/asphalt pads, roads, parking areas) to generate supplemental Category 1 material as directed by the Construction Manager.
- D. Size-reduce piping and debris to meet the physical WAC for OSDF in accordance with the IMPP, or size requirement for SP7 in accordance with this Section.
- E. Size-reduce metal materials (i.e., structural steel, piping, equipment, miscellaneous metal) in accordance with IMPP and Part 8. Load all metal components in bulk and haul to the OSDF.

3.11 GENERAL LOADING AND HAULING

- A. Use paved haul roads designated on the Drawings for hauling. Upon entering the paved haul roads with haul equipment, do not exit except to the excavation area, SP7, and/or the OSDF, without approval by the Construction Manager.
- B. When hauling materials to the SMTA, enter the SMTA from the excavation area only.
- C. Load haul equipment in a fashion to minimize load shifting during transit.
- D. Load haul equipment in a fashion to prevent spillage during transit.
- E. Extend automatic covers on suitably equipped haul equipment, whether full or empty, during all periods of equipment movement outside of radiological controlled areas.
- F. Keep equipment cab closed and stay within the equipment cab when inside any posted contamination area without appropriate PPE except in emergency situations.
- G. Provide material tracking information in accordance with the Material Tracking Plan located on the Drawings.

- H. Prior to loading any soil for disposition, confirm the material contains no free liquid per the guidelines of the Environmental Protection Agency Paint Filter Test (EPA SW 846 Method 9095). The Construction Manager reserves the right to request the Contractor to perform an EPA Paint Filter Test at any time. Rework any material that fails the paint filter test as directed by the Construction Manager.

3.12 STOCKPILING

- A. Install construction fence around active stockpiles in accordance with Section 02200.
- B. Install appropriate signage, provided by the Construction Manager, around the boundary of all active stockpiles.
- C. Install erosion control measures around active stockpile in accordance with Section 02275.
- D. Maintain fencing, signage, and erosion control measures for the duration of the active stockpile's existence.
- E. Repair contractor-inflicted damage to active stockpile support structures (i.e., silt fence, perimeter fence) to their original condition within 24 hours of damage discovery at no additional cost to Fluor Fernald.
- F. Apply crusting agent as specified in Section 02275 within 7 calendar days upon completion of the active soil stockpile or if the active soil stockpile is to be inactive for more than 45 calendar days.
- G. Compact/seal the surface of the stockpile in use at the close of each work-day to prevent fugitive dust and erosion.
- H. Construct stockpiles with maximum slopes of 3H:1V and a maximum height to base ratio 0.2.
- I. Locate interim stockpiles within the limits of the Project boundary upon approval of the Construction Manager. Remove interim stockpiles within 45 calendar days.
- J. Establish a separate stockpile area, as directed by the Construction Manager, if solvent saturated soils are encountered. Manage the stockpile material to avoid cross-contamination with adjacent soil, and to control surface water and dust.
- K. Stockpile all excavated surface aggregate materials and size-reduced concrete and asphalt in the North OMTA, located north of the IMHR as shown on the Drawings. This material shall be used as temporary aggregate material, as shown on the Drawings, or as supplemental Category 1 material.
- L. Stockpiles shall not be located within 30 feet of an excavation top-of-slope.
- M. Load and haul material from soil Stockpile SP4 to the OSDF to maintain the stockpile's volume below 10,000 cubic yards. SP4 must be removed by the end of the construction season.

N. In addition to general stockpiling requirements, the following requirements shall apply to the management of SP7:

1. Use dedicated equipment for the preparation and management of SP7.
2. Maintain ingress/egress to the SP7, including access roads, ramps, and drainage features.
3. Maintain the unloading area that prevents haul equipment tires from coming in contact with the Above-WAC material.
4. Place Above-WAC material in locations designated by the Construction Manager.
5. Decontaminate tools and equipment used to place and manage Above-WAC material within SP7 prior to requesting release. Following decontamination, the Construction Manager will perform a radiological survey to release tools and equipment.

3.13 MONITORING AND SAMPLING

- A. The Construction Manager will perform real-time monitoring of all Below-WAC areas following removal of surface aggregate; concrete and asphalt slabs, pads, roads and parking areas and when the design surface has been achieved.
- B. The Construction Manager will perform real-time monitoring between excavation lifts for Above-WAC materials.
- C. The Construction Manager will perform radiological monitoring before equipment is released from the buffer area, as required in Part 8. Working in rain and/or wet weather will increase scanning time.
- D. The Construction Manager will perform visual monitoring during excavation for Special Materials that are not permitted in the OSDF or that will require additional processing to meet WAC. If Special Materials are found, real-time monitoring may be performed to verify removal and determine appropriate disposition of the material.
- E. The Construction Manager will visually monitor all piping and debris to ensure no visible process residue remains, in order to be placed in the OSDF.
- F. The Construction Manager will perform real-time monitoring to verify that the excavation area has met the requirements for recertification.
- G. When real-time monitoring or sampling is required, excavate in an alternate location within the excavation area while awaiting the results, at no additional cost to Fluor Fernald. Excavate alternate locations a minimum of 50 feet from the area being monitored. Allow up to 2 working days for monitoring after area is ready for monitoring. Extend duration for monitoring at least 1 working day for each day precipitation occurs.
- H. The Construction Manager and regulatory agencies may collect samples from the excavation, haul equipment and the OSDF at any time during the project at no additional cost to Fluor Fernald.
- I. The Construction Manager will collect physical samples after completion of excavation activities in RCRA hazardous areas and other area designated by the Construction Manager. Allow 10 working days for sampling and analysis by the Construction Manager.

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3.14 PRECERTIFICATION AND SUPPLEMENTAL EXCAVATION

- A. The Construction Manager will perform real-time monitoring to pre-certify an area as having attained FRL requirements.
- B. Perform supplemental excavations beyond the design surface as directed by the Construction Manager, or if the following conditions exist:
 1. Real-time monitoring and/or physical sampling identifies material beyond the design surface that does not meet FRL requirements.
 2. Unidentified utilities or other impacted materials are found beyond the design surface.
- C. Install rope fencing along the perimeter of the pre-certified area upon notification from the Construction Manager that precertification has been achieved. The Construction Manager will install appropriate signs.

3.15 AREA MANAGEMENT

- A. Maintain construction fence and radiological control fence as specified in Section 02200, and as shown on the Drawings.
- B. Water management shall be as specified in Section 02275.
- C. Perform stabilization of the excavated areas using crusting agent and temporary seeding in accordance with Sections 02275 and 02930, respectively.
- D. Notify the Construction Manager prior to removing sediment and debris from ditches, drains and erosion control devices. The Construction Manager will sample and test sediment for WAC compliance. Remove and de-water sediment in accordance with the following:
 1. Notify the Construction Manager two (2) days prior to removing sediment from ditches, drains and erosion and sediment control devices for sampling and analysis of the sediment for disposition.
 2. Remove accumulated sediment from ditches, drains and erosion and sediment control devices as directed by the Construction Manager. In no case shall sediment reduce the available depth of the associated feature to less than two-thirds the depth shown on Construction Drawings.
 3. De-water sediment removed from Above-WAC or RCRA hazardous areas within the associated Above-WAC or RCRA hazardous area.
 4. De-water sediment removed from ditches, drains and erosion and sediment control devices adjacent to and up-gradient of the associated feature as necessary to allow water to drain immediately back into the feature.
 5. Pending approval from the Construction Manager, disposition de-watered sediment to the OSDF unless otherwise directed by the Construction Manager.
 6. Excavate, collect and place sediments accumulated in the SP7 surface water control devices in SP7.
- E. Implement seasonal closure methods at the end of each construction season, as described in the Contractor's approved Excavation Work Plan. Maintain seasonal closure through winter shutdown. Seasonal shutdown requirements include, but are not limited to:

1. Maintain surface water management and erosion and sediment controls.
2. Maintain dust control, as required in Part 6.
3. Perform equipment decontamination, as required.
4. Remove water from excavation during seasonal closure, when water depth exceeds 1-foot. Pump water out of the excavations in a manner that maintains the integrity of the 2H:1V side slopes, (i.e., no rapid draw down) and prevents an overflow condition. The pumping priority for open excavations is as follows:
 - a. Open excavation areas containing impacted material that are located up-gradient of remediated areas,
 - b. Completed excavations, and
 - c. Other uncompleted excavations.
5. Seed/stabilize stockpiles.

3.16 UTILITY REMOVAL BELOW THE DESIGN SURFACE

- A. Prior to excavating utilities below the design surface, satisfy the following conditions:
 1. Complete the intermediate survey, as specified in Section 02100.
 2. Obtain Construction Manager approval that real-time monitoring of the design surface is complete.
- B. Excavate, remove utilities, and backfill trenches located below the design surface in accordance with the details shown on the Drawings and Section 02206.
- C. If visual monitoring identifies Special Materials during these utility excavations, perform supplemental excavation in accordance with this Section.
- D. Excavate miscellaneous debris that is encountered below the design excavation grade and disposition in accordance with this Section.

END OF SECTION

Table 02205-1

The table should be interpreted to read that material in column 1 may be dispositioned at the appropriate destination in columns 2-4 if the corresponding criteria are met.

MATERIAL	DESTINATION			SMTA (2)
	OSDF	SP7 (3)	SP7 (3)	
Soil – general excavation/UST	<ul style="list-style-type: none"> Meets WAC 	<ul style="list-style-type: none"> Above WAC 	<ul style="list-style-type: none"> Above WAC 	<ul style="list-style-type: none"> Not applicable
Soil – RCRA hazardous	<ul style="list-style-type: none"> Prohibited 	<ul style="list-style-type: none"> Prohibited 	<ul style="list-style-type: none"> Prohibited 	<ul style="list-style-type: none"> Containertize
Soil – HWMU	<ul style="list-style-type: none"> Meets WAC 	<ul style="list-style-type: none"> From an Above-WAC area 	<ul style="list-style-type: none"> From an Above-WAC area 	<ul style="list-style-type: none"> RCRA Hazardous
Soil – Requiring treatment	<ul style="list-style-type: none"> Prohibited pending treatment and direction by the Construction Manager 	<ul style="list-style-type: none"> Prohibited pending treatment and direction by the Construction Manager 	<ul style="list-style-type: none"> Prohibited pending treatment and direction by the Construction Manager 	<ul style="list-style-type: none"> Fails treatment
Debris – general excavation/UST	<ul style="list-style-type: none"> Meets WAC 	<ul style="list-style-type: none"> Above WAC 	<ul style="list-style-type: none"> Above WAC 	<ul style="list-style-type: none"> Not applicable
Debris – Above WAC	<ul style="list-style-type: none"> Meets WAC and free of visible soil/residue 	<ul style="list-style-type: none"> Visible residue cannot be removed 	<ul style="list-style-type: none"> Visible residue cannot be removed 	<ul style="list-style-type: none"> Not applicable
Debris – RCRA hazardous	<ul style="list-style-type: none"> Meets WAC and free of visible soil/residue 	<ul style="list-style-type: none"> Visible soil/residue cannot be removed 	<ul style="list-style-type: none"> Visible soil/residue cannot be removed 	<ul style="list-style-type: none"> Not applicable
Debris – HWMU	<ul style="list-style-type: none"> Meets WAC 	<ul style="list-style-type: none"> Above WAC and free of visible soil/residue 	<ul style="list-style-type: none"> Above WAC and free of visible soil/residue 	<ul style="list-style-type: none"> Visible soil/residue cannot be removed
Asbestos (3)	<ul style="list-style-type: none"> Meets WAC and passes visual inspection by CM 	<ul style="list-style-type: none"> Above WAC and non-friable 	<ul style="list-style-type: none"> Above WAC and free of visible soil/residue 	<ul style="list-style-type: none"> Above WAC and visible soil/residue cannot be removed
Non-pressurized Containers (3)	<ul style="list-style-type: none"> Meets WAC, free of visible soil/residue, and contains no free liquid, product, etc 	<ul style="list-style-type: none"> Visible soil/residue cannot be removed and non-friable 	<ul style="list-style-type: none"> Above WAC and contains no free liquid, product, etc. 	<ul style="list-style-type: none"> Friable and fails visual inspection by CM
Piping/Pumps (3)	<ul style="list-style-type: none"> Meets WAC, free of visible soil/residue, and contains no free liquid 	<ul style="list-style-type: none"> Visible soil/residue cannot be removed and contains no free liquid, product, etc. 	<ul style="list-style-type: none"> Interior not visible and contains no free liquid 	<ul style="list-style-type: none"> Contains free liquid, residue, etc
Transformers/Electrical Equipment (3)	<ul style="list-style-type: none"> Meets WAC, free of visible soil/residue, and contains no free liquid 	<ul style="list-style-type: none"> Visible soil/residue cannot be removed and contains no free liquid 	<ul style="list-style-type: none"> Visible soil/residue cannot be removed and contains no free liquid 	<ul style="list-style-type: none"> Above WAC/HWMU and visible soil/residue cannot be removed
Brick including Acid Brick (3)	<ul style="list-style-type: none"> No acid brick (4) 	<ul style="list-style-type: none"> Acid brick (4) 	<ul style="list-style-type: none"> Acid brick (4) 	<ul style="list-style-type: none"> Above WAC/RCRA and visible soil/residue cannot be removed
Lead Acid Batteries (3)				<ul style="list-style-type: none"> Contains fluid
Medical Infectious Waste (3)				<ul style="list-style-type: none"> Above WAC/HWMU and visible soil/residue cannot be removed
Non-soil Residue (3)				<ul style="list-style-type: none"> Above WAC/RCRA and visible soil/residue cannot be removed
Pressurized Containers (3)				<ul style="list-style-type: none"> Not applicable
Tires (3)				
Uranium Metal (3)				
Sealed radiological calibration sources				
	<ul style="list-style-type: none"> Prohibited 	<ul style="list-style-type: none"> Prohibited 	<ul style="list-style-type: none"> Prohibited 	<ul style="list-style-type: none"> Containertize

(1) Must meet SP7 size requirements per this Section (2) SMTA materials must be containertized. (3) Special Material per this Section. (4) Acid brick is red or reddish-brown brick and fragments.

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SECTION 02206
EARTHWORK FOR REMEDIATION

PART 1 GENERAL

1.1 SCOPE

- A. This Section includes requirements for earthwork associated with remediation of the former production area to include, but is not limited to:
1. Excavation of backfill material.
 2. Excavation and placement of materials for ditches and berms.
 3. Placement of backfill material in trenches excavated for utility removal in areas below design surface.
 4. Placement of plug material over the unsaturated sands and gravels of the Great Miami Aquifer (GMA).
 5. Interim grading for drainage and road preparation.

1.2 RELATED SECTIONS AND DOCUMENTS

- A. Section 02100 – Surveying.
- B. Section 02200 – Earthwork.
- C. Section 02205 – Impacted Material Excavation.
- D. Section 02275 – Erosion and Sediment Control and Surface Water Management.
- E. Section 02930 – Vegetation.
- F. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
1. ASTM D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft), current edition.
 2. ASTM D2216 Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock, current edition.
 3. ASTM D2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System), current edition.
 4. ASTM D2922 Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

5. ASTM D3017 Standard Test Methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
6. ASTM D4643 Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Method.

1.4 DEFINITIONS

- A. Backfill: Non-impacted soil obtained from within the excavation area, below the design surfaces, or from a designated borrow area.
- B. Design Surface: Excavated surfaces created when the Contractor excavates impacted material to the lines and grades as shown on the Drawings.
- C. GMA Plug: Non-impacted gray clay material used to maintain a minimum protective cover thickness over, and seal breaches into, the GMA unsaturated sands and gravels.

1.5 SUBMITTALS

- A. Submit for approval, name, address, and qualifications of an independent soil testing laboratory and resume(s) of field technician(s).
- B. Provide copies of all lab/field soil tests performed by soil testing laboratory and Contractor within seven (7) calendar days of obtaining samples for performing field tests, or upon request by the Construction Manager. Soil test results shall include Standard Proctor moisture density tests, sieve analysis, density tests, and Proctor curves for each type of material to be used prior to its use.
- C. Submit catalog cut sheets and MSDS for sodium bentonite grout.

1.6 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Backfill material shall be free of debris, foreign objects, large rock fragments (maximum dimension of 6 inches), organic, and other deleterious materials.
- B. GMA plug material shall be backfill material conforming to CL classification according to United Soil Classification System in accordance with ASTM D2487.
- C. Portland cement per ASTM C150, normal – Type 1.

- D. Sodium bentonite grout.

2.2 EQUIPMENT

- A. Furnish and maintain equipment to perform required operations in conformance with the requirements of these specifications and in accordance with Part 8.
- B. Equipment used to haul non-impacted material over the existing paved Impacted Material Haul Road (IMHR), shall be equal to or less than the gross vehicle weight and axle loading for a Caterpillar CAT D300E haul truck (gross vehicle weight of 120,000 pounds and maximum axle width of 9-feet 10-inches). Pavement width of the existing two-way IMHR is 24-feet. Select equipment and equipment width to ensure safe operation on this road.
- C. Equipment used within the excavation area shall be equal or less than the gross weight for a Caterpillar CAT 350L track hoe (112,500 pounds). However, the Construction Manager may approve the use of heavier equipment in this area provided the Contractor submits supporting calculations in accordance with Section 02205.
- D. Furnish compaction equipment, as needed.

PART 3 EXECUTION

3.1 GENERAL

- A. Perform intermediate surveys in accordance with Section 02100, to confirm attainment of design surface prior to initiating earthwork activities below the design surface.
- B. Stop excavation activities and immediately notify the Construction Manager upon discovery of unexpected cultural resources suspected to be historic, prehistoric, or archeological site, feature or object.
- C. Excavate soil below the design surface with equipment free of visible above-FRL soil.
- D. Protective system for trenching and excavation activities shall comply with OSHA 29 CFR 1926.650 Subpart P.
- E. Use material from the immediate excavation area or a designated borrow area to meet backfill requirements for trenches and supplemental excavations.
- F. Perform construction activities such that surface water runoff from non-certified construction areas does no flow into pre-certified areas in accordance with Section 02275.
- G. Outside of utility trenches created by excavating utilities below the design surface, maintain slope stability in accordance with Section 02205.

3.2 EXCAVATION AND BACKFILL

- A. Obtain backfill material from an area approved by the Construction Manager. In high-leachability areas, as shown on the Drawings, obtain backfill from areas meeting the 20 mg/kg total Uranium FRL, or precertification high-leachability areas, as directed by the Construction Manager.
- B. Backfill shall be used for GMA plug material and to backfill utility trenches below the design surface.
- C. Maintain a minimum 5-foot protective cover over the unsaturated sands and gravel of the GMA in accordance with the following. GMA elevations are shown on the Drawings:
 - 1. Whenever work activities encroach on the 5-foot protective cover but do not extend within 2-feet of the GMA, install GMA plug as follows:
 - a. Allow the Construction Manager 5 workdays to collect physical samples in the area to be backfilled.
 - b. Within 10 workdays following the completion of sampling, backfill using GMA plug material meeting the requirements of this Section.
 - c. Backfill GMA plug material in 8-inch +/- 1-inch loose lifts until protective cover is returned to a minimum thickness of 5-feet.
 - d. Compact backfill in each 8-inch loose lift to at least 95% Standard Proctor dry density (ASTM D 698) within +/- 3% of optimum moisture content.
 - 2. Coordinate with the Construction Manager prior to initiating work activities which will encroach within 2 feet of or breach the GMA. Whenever work activities extend to within 2 feet of or breach the GMA, install GMA plug as follows:
 - a. A minimum compacted thickness of 2 feet shall be placed within 24 hours of extending to within 2 feet or breaching the GMA.
 - b. Allow the Construction Manager to collect physical samples in the area prior to backfilling.
 - c. Backfill using GMA plug material meeting the requirements of this Section.
 - d. Place first lift of backfill material in minimum 18-inch loose lift. Compact first lift using 4 passes of compaction equipment as approved by the Construction Manager.
 - e. Backfill remaining lifts in 8-inch +/- 1-inch loose lifts until protective cover is returned to a minimum of 5 feet. Compact backfill in each 8-inch loose lift to at least 95% Standard Proctor dry density (ASTM D698) within +/- 3% of optimum moisture content. These lifts must be continuous over the entire breached area.
- D. Install clay plug in locations shown on the drawings in accordance with the following:
 - 1. Backfill using backfill material meeting the requirements of this Section.
 - 2. Place backfill in 8-inch +/- 1-inch loose lifts as necessary to achieve a total compacted thickness of 2-feet.
 - 3. Compact each lift with four (4) passes of compaction equipment as approved by the Construction Manager.

4. If clay plug is placed over an open pile, seal any void spaces within the pile with sodium bentonite grout and cap the top 2 feet of the pile with Type 1 Portland cement ASTM C150 prior to placing the clay plug. Sodium bentonite grout shall be mixed at a water ratio of 2.1 pounds of sodium bentonite per gallon of water, and have a minimum density of 9.4 lbs./gallon. Grout viscosity shall be field checked periodically to assure proper viscosity of 70 +/- 6 seconds using the Marsh funnel viscometer.
- E. Excavate, remove utilities, and backfill trenches below the design surface in accordance with the following:
1. Remove utilities located below the design surface in accordance with Section 02205 and details specified on the Drawings.
 2. Remove water collected in trenches to sump areas and pump it to the Tank Farm Settling Basin as specified in Section 02275.
 3. Upon approval by the Construction Manager, backfill trenches with staged overburden soil or soil material from the immediate area in accordance with the Drawings.
 4. For utility trenches located outside of deep excavations, backfill trench in 8-inch +/- 1-inch loose lifts to match existing grade. Compact each lift with 4 passes of compaction equipment as approved by the Construction Manager.

3.3 FIELD QUALITY CONTROL

- A. In-place density testing will be performed in accordance with ASTM D2922. Nuclear density gauge (ASTM D2922) will be calibrated in accordance with the manufacturer's requirements. Documentation of this calibration will be provided to the Construction Manager. Register any nuclear or radiological sources brought on site in accordance with the requirements of Part 8.
- B. Perform moisture tests in accordance with ASTM D3017, ASTM D2216, or ASTM D4643 as applicable.
- C. Determine moisture-density curves in accordance with ASTM D698 (Standard Proctor). Test results must be reviewed and approved by the Construction Manager.
- D. If in-place and/or moisture tests indicate that work does not meet specified requirements, remove work and replace or re-compact to specified requirements. If visual inspection indicates that work has not been performed as specified, correct work to comply with the requirements.
- E. Perform soil classification in accordance with ASTM D2487.
- F. Frequency of Tests: Frequency of in-place density and moisture testing shall be whichever of the following requires the greatest number of test:
1. Once each day when compacting GMA plug material.
 2. Once each compacted lift of GMA plug material.
 3. Once every 3,000 sq. ft. of compacted GMA plug material.

- G. Notify the Construction Manager of activities that will require testing/inspection prior to the start of such activities.

3.4 EARTHEN BERMS

- A. Install earthen berms at locations shown on the Drawings using GMA plug material.
- B. Place GMA plug material in 8-inch loose lifts.
- C. Compact each lift of berm with 4 passes of compaction equipment approved by the Construction Manager.

3.5 INTERIM GRADING

- A. When the design surface has been achieved, perform interim grading as follows:
 1. Correct washouts or other similar irregularities to maintain the design surface slopes of 2H:1V or less.
 2. Grade to maintain smooth continuous slopes.
 3. Finish ditches so they drain readily.
 4. Leave the interim grade 1 inch lower than the top of the maintenance road elevation where bulking of soil caused by grass growth will prevent drainage from the road.
 5. Perform seeding in accordance with Section 02930.
 6. Repair any damage within 3 working days.

3.6 SURFACE WATER MANAGEMENT

- A. Manage surface water in accordance with Section 02275 and the Contractor's approved Surface Water Management Plan.
- B. Perform excavation in a manner that promotes positive drainage.
- C. Install temporary diversions as shown on the Construction Drawings. Seed and fertilize temporary diversions in accordance with Section 02930.

3.7 SEASONAL SHUTDOWN

- A. Perform seasonal shutdown activities in accordance with Section 02205.

END OF SECTION

SECTION 02207
AREA ISOLATION TRENCHING

PART 1 GENERAL

1.1 SCOPE

- A. This Section includes the requirements for trenching, excavating, and backfilling an isolation trench around the project excavation boundary, as shown on the Drawings.

1.2 RELATED SECTIONS AND DOCUMENTS

- A. Section 02100 – Surveying.
- B. Section 02200 – Earthwork.
- C. Section 02205 – Impacted Material Excavation
- D. Section 02206 – Earthwork for Remediation
- E. Section 02275 – Erosion and Sediment Control and Surface Water Management.
- F. Part 6 - Statement of Work.
- G. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. Title 29, Code of Federal Regulations (CFR): 29 CFR 1926.650 Subpart P – Excavation, current edition.

1.4 DEFINITIONS

- A. Special Materials: Impacted material requiring special handling as specified in Section 02205 and presented in Table 02205-1.
- B. Trencher: Specific piece of equipment used to dig the area isolation trench around the area boundary.

1.5 SUBMITTALS

- A. Submit an Area Isolation Trenching Plan as part of the Safe Work Plan, as required in Part 6 and Part 8, to describe the technical approach for the execution and management of excavation, trenching, and backfilling the area isolation trench specified in this Section. The plan shall include the following:

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- a. Description of equipment to be used for trenching, excavating, and backfilling.
- b. Copy of trencher manufacturer's operations and maintenance, and safety manuals.
- c. Methods for protecting operator and other site personnel from unidentified energy exposure (i.e. electric, gas, pressure lines, etc.).
- d. Safety methods and PPE requirements for safe operation of the equipment, including safe distances required for personnel and other obstructions during trenching activities.
- e. Methods for excavation, trenching, and backfilling activities, including staging of trench material where removed from the trench.
- f. Methods for protection of structures/utilities to remain as shown on the Drawings.
- g. Methods for air-gapping utilities in areas unable to be trenched.
- h. Methods for dewatering excavations and trenches.
- i. Maintenance and fueling of equipment.
- j. Methods of mitigating fugitive dust per the requirements in Part 6.

- B. Submit name, address, and qualifications of all independent testing laboratories in accordance with Section 02206.

1.6 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental Health and Safety, and Training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide fencing materials in accordance with Section 02200.
- B. Provide 3/8-inch yellow nylon rope fence.
- C. Provide construction area signage in accordance with Part 8.
- D. Provide dust suppression agent as specified in Section 02275.

2.2 EQUIPMENT

- A. Furnish and maintain equipment to perform trenching, excavation, and backfilling activities to conform with this Section and in accordance with Part 8.
- B. Provide trencher equipped with a digging chain, capable of being electrically isolated/grounded during trenching activities. Manufacturer shall be Vermeer, or approved equivalent. Digging chain(s) will be turned over to Fluor Fernald at the completion of the Contract.
- C. Equipment used to trench and excavate shall have enclosed cabs. Enclosed cab is defined as an equipment cab isolated from the outside environment (intact windows, doors, panels and floors surrounding driver with all windows and doors shut) which provides a barrier from intrusion of outside

airborne particles. Any heating, ventilating, or air conditioning units associated with the equipment cab must not provide a direct path for outside air to enter (air conditioner on air recirculate mode) unless the air is first passed through a high efficiency particulate air filter pulled directly from outside the cab.

- D. Provide compaction equipment as necessary to meet the requirements of this Section.
- E. Provide water tank trucks, water wagons, hydroseeders, portable tanks, pressure distributors, piping, sprinklers or other equipment designed to apply water and/or dust suppressant and crusting agent uniformly and in controlled quantities to variable surface widths to provide fugitive dust control as required in Part 6.
- F. Provide portable wash equipment to wash vehicle tires and vehicle exteriors as necessary.

PART 3 EXECUTION

3.1 GENERAL

- A. Survey and layout trenching/excavation limits in accordance with Section 02100 and as shown on the Drawings. Remove or relocate surface obstructions that may impede trencher operations, prior to trenching, with approval from the Construction Manager.
- B. Prior to any trenching activities, install temporary fencing, barricades, and signage as specified in Part 8, and as approved by the Construction Manager, to establish safe distances around the trench and excavations during operation of the equipment, and while trenches and excavations remain open.
- C. Install, modify, and manage radiological control fencing for trenching activities as directed by the Construction Manager. Radiological control signs will be furnished and installed by the Construction Manager.
- D. Install and manage surface water management and erosion and sediment control measures in accordance with Section 02275.
- E. Excavate, trench, and backfill in accordance with this Section and the Contractor's approved Safe Work Plan.
- F. Blasting, including use of explosives or explosive devices, is not permitted.
- G. Maintain equipment in a safe condition within the trenching/excavation area during periods of non-work (evening, weekends, and holidays).
- H. Prohibit tracked equipment from hauling, operating, or tracking over or on the Impacted Material Haul Road (IMHR) or other paved roadways unless otherwise approved by the Construction Manager.
- I. In the event a historic, prehistoric, or archeological site, feature, or object is discovered, stop trenching/excavating in the area and immediately notify the Construction Manager.

3.2 TRENCHING/EXCAVATION

- A. Trench at locations, as shown on the Drawings, using approved trencher equipment. Trenches shall be cut to a minimum depth of 12 feet (-0" to +6") and a minimum width of 2 feet. Trench location shall have a lateral tolerance of +/- 1-foot.
- B. Trench/excavate material in such a manner that enables the Construction Manager to visually observe all trenching/excavating activities.
- C. Excavate areas around utilities and structures to remain, or other areas inaccessible to the trencher with equipment approved by the Construction Manager, to verify no active utilities are present. Air gap any active utilities found in areas that are unable to be trenched using methods and equipment as approved by the Construction Manager. Remove and dispose of pipe sections removed during air-gapping in accordance with Section 02205.
- D. Stop excavation and immediately notify the Construction Manager if unidentified utilities are encountered.
- E. Continuously observe excavations for Special Materials for change in materials. Stop excavating in the area and immediately notify the Construction Manager if any Special Materials are encountered. Dispose of Special Materials in accordance with Table 02205-1 and as directed by the Construction Manager.
- F. Perform trenching activities in such a manner as to minimize water accumulation in the trench. Pump water collected in the trench as directed by the Construction Manager.
- G. Backfill all trenches and excavations daily unless otherwise approved by the Construction Manager. Trenches or excavations remaining open after working hours shall be barricaded in accordance with Part 8.
- H. Verify and record trench as-built information (centerline of trench and depth) every 50 feet in accordance with the requirements of Section 02100. Include coordinates for all points to include area isolation trench turning points.

3.3 BACKFILL

- A. Backfill trenches and excavations using material removed during trenching and excavation activities. The final 24 inches of backfill placed shall be free of debris, foreign objects, large rock fragments (maximum dimension of 6 inches), organic matter, and other deleterious materials so as to obtain required compaction.
- B. Backfill trenches and excavations to within 24 inches of grade. Backfill and compact 24 inches remaining in 8-inch lifts compacted to at least 95% standard Proctor dry density (ASTM D698) with a moisture content within +/-3% of optimum moisture (ASTM D698). Testing frequency of standard density test (ASTM D698) shall be one test every 300 linear feet of trench per lift with a minimum of one test per lift.

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- C. Backfill trenches to match surrounding grade. Obtain supplemental backfill as necessary from areas as directed by the Construction Manager.
- D. After completion of backfilling activities, install and modify radiological boundary fence to locations as shown on the Drawings unless otherwise directed by the Construction Manager.

END OF SECTION

SECTION 02210
ASBESTOS CONTAINING MATERIALS (ACM)

PART 1 GENERAL

1.1 SCOPE

This Section includes the following requirements for asbestos containing materials (ACM), but is not limited to:

- A. Handling, packaging, loading, hauling, and unloading friable and non-friable asbestos containing material (ACM).
- B. Removal of at- or below-grade ACM, which may include the following:
 - 1. Pipes coated with thermal system insulation.
 - 2. Electrical cable insulated with ACM.
 - 3. Fireproofing tape in electric manholes.
 - 4. Piping containing gasket material.
 - 5. Piping coated with construction mastic.
 - 6. ACM embedded in concrete.
 - 7. Buried ACM not associated with underground utilities.
- C. Placement at the On-Site Disposal Facility (OSDF).

1.2 DEFINITIONS

- A. Asbestos: Chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that has been chemically treated and/or altered. For purposes of this specification, asbestos includes presumed asbestos containing material (PACM), as defined herein.
- B. ACM: Any material containing more than 1 percent asbestos. For purposes of this specification, the term ACM includes PACM, as defined below.
- C. PACM: Thermal system insulation (TSI) and surfacing material found in buildings constructed no later than 1980. The designation of material as "PACM" may be rebutted by performance of bulk sampling and analysis demonstrating that the PACM does not contain more than 1 percent asbestos, as described in 29 CFR 1926.1101(k)(5).
- D. Active Asbestos Waste Disposal: Unloading of asbestos waste and placement at the OSDF is considered active asbestos waste disposal as termed in the referenced administrative code and federal regulations.
- E. Class I Asbestos Work: Activities involving the removal of TSI and surfacing ACM and ACM. For purposes of this specification, includes, but is not limited to, the first time removal of at- or below-grade TSI associated with utilities.
- F. Class II Asbestos Work: Activities involving the removal of ACM which is not TSI or surfacing material. For purposes of this specification, includes but is not limited to, first time

removal of at- or below-grade ACM other than TSI and surfacing material that is associated with utilities.

- G. Renovation: Altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or taken out are excluded from this definition. Removal of ACM related to at- or below-grade utilities is considered a renovation activity for purposes of the referenced administrative code and federal regulations.
- H. Inactive Asbestos Waste Disposal Site: Any disposal site or portion of it where additional asbestos-containing waste material has not been deposited for 1 year and where the surface is not disturbed by vehicular traffic. For purposes of this specification, includes locations where ACM that was previously removed from a building or structure, or excess ACM building materials, was buried for disposal.
- I. Removal of transite or other non-friable ACM from an inactive asbestos landfill does not fall under a certain "class" of work as defined by OSHA. Requirements will be established using best available technology and best management practices to minimize worker exposure.
- J. Asbestos Competent Person: A person capable of identifying asbestos hazards in the work place, selecting appropriate control strategies for the asbestos exposure, and prompt corrective action. Person has the forty-hour asbestos contractor/supervisor training and holds the Asbestos Hazard Abatement Specialist Certification from the Ohio Department of Health (ODOH).

1.3 RELATED DOCUMENTS

- A. Part 8 – Environmental Health and Safety, and Training Requirements.

1.4 REFERENCES

- A. Ohio Administrative Code (OAC), Chapter 3745-20, Asbestos Emission Control.
- B. Ohio Administrative Code (OAC), Chapter 3701-34, Asbestos Hazards Abatement Rules.
- C. Title 29, Code of Federal Regulations (CFR), Part 1926.1101, Asbestos.
- D. United States Environmental Protection Agency (U.S. EPA) 40 CFR 61, Subpart M, (NESHAPS).
- E. Impacted Materials Placement Plan (IMPP), On Site Disposal Facility (OSDF), 20100-PL-007, current edition.

1.5 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

1.6 SUBMITTALS

- A. Submit an ACM Removal and Handling Work Plan, prepared by an Asbestos Project Designer certified by the ODOH and in compliance with all applicable federal (CFR) and state (OAC) requirements in accordance with Part 8 of this Contract.
- B. Submit the following documentation prior to initiation of ACM work:
1. Names of all personnel assigned to the asbestos removal tasks of the Project.
 2. Copies of asbestos training certificates for asbestos workers, project designer, contractor/supervisor.
 3. Documentation, in the form of a physician's written opinion, that each worker performing Class I, Class II, or Class III asbestos removal tasks are physically fit to perform asbestos work.
 4. Documentation, in the form of a physician's written opinion, that each worker involved in asbestos removal work is physically fit to wear a respirator.
 5. Documentation of quantitative respirator fit-test.
 6. Documentation of respirator training.
 7. Employee exposure assessments (if available).
 8. Documentation of current certification as a licensed asbestos abatement contractor by the State of Ohio, as required for Class I work.
 9. State of Ohio certification for all personnel as required by law (for friable asbestos work).
 10. State of Ohio certification for the Asbestos Project Designer.
 11. Copy of required notifications and applicable fees to ODOH.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Disposal Bags: Clear polyethylene a minimum of 6 mils thick.
- B. Sheeting: Clear polyethene a minimum of 6 mils thick
- C. Surfactants: Childers - CP-225 CHIL-SORB or approved equal.
- D. Encapsulants:
1. Childers - CP-240 CHIL-LOCK.
 2. Certified Technologies - Certane 2050.
 3. Eppert Environmental Products - Eppco #1.
 4. International Protection Coatings Corp - Serpiloc.
 5. Or approved equal.

E. Lockdowns:

1. Certane - 1050 – Clearcoat.
2. Eppert - Fiber-Seal.
3. International Protection Coatings Corp - Serpiloc.
4. Or approved equal.

F. Other materials required by the Contractor for handling and packaging of ACM including, but not limited to, asbestos warning tape and signs, tape, knives, and garden sprayer.

G. Glovebags made of 6-mil plastic, seamless at the bottom, designed for asbestos work.

2.2 EQUIPMENT

- A. For glovebags, a HEPA filtered vacuum system may be used to provide negative air pressure in accordance with the requirements of 29 CFR 1926.1101.
- B. HEPA filtered vacuum for cleanup.
- C. Cable pulling equipment.
- D. Any and all equipment required to implement the removal as defined for the Contractor ACM Removal and Handling Work Plan.

PART 3 EXECUTION

3.1 GENERAL

- A. The Contractor shall make the required notifications and pay applicable fees to the ODOH and provide a copy of all documentation to the Construction Manager.
- B. At least 10 working days prior to issuing notification to the ODOH, the Contractor shall meet with the Construction Manager and Environmental Compliance Officer to ensure that the Contractor's Ohio Department of Health Notification and Construction Manager's Ohio EPA Notification are consistent.
- C. Excavate and remove underground utilities in such a manner that mitigates the generation of friable asbestos material. Friable asbestos material created by Contractor work activities shall be removed and handled by the Contractor at no additional cost to Fluor Fernald.
- D. The Contractor shall:
 1. Comply with work practices and procedures set forth in all applicable Federal, State, and local codes, regulations, and standards.
 2. Obtain ODOH certification as a licensed asbestos abatement contractor by the State of Ohio, as required, for friable asbestos removal.
 3. Ensure workers, supervisors, and project designer performing asbestos work have necessary ODOH certifications, as required, for friable asbestos removal.
 4. Ensure workers have been assessed by medical and physician's written opinions have been documented for asbestos work and respirator use.
 5. Take precautions to prevent creation of friable ACM during handling.

6. Ensure Contractor's (inclusive of Subcontractor) employees are informed of the presence of ACM in the project work areas in accordance with 29 CFR 1926.1101(d) and OAC 3745-20-06(B)(4).
7. Establish a restricted work area at the OSDF that is adequate to deter entry of unauthorized personnel within 100 feet of the ACM work areas during unloading, deposition, burial, and initial compaction of asbestos containing waste materials, in accordance with OAC 3745-20-06(B)(4).
8. Establish an asbestos regulated area for Class I, II, and III asbestos work, or where airborne concentrations of asbestos exceed, or there is a reasonable possibility to exceed a PEL, in accordance with 29 CFR 1926.1101 (e). The regulated area shall be marked to minimize the number of persons within the area and protect persons outside the regulated area from exposure to airborne asbestos. Access to regulated areas shall be limited to authorized persons.
9. Obtain and conform to required training in accordance with Part 8.

E. Materials to be used as encapsulants and surfactants shall be in original, new, and unopened packages and containers bearing manufacturer's name, label and the following information:

1. Name of material.
2. Manufacturer's stock number and date of manufacture.
3. Manufacturer's name.
4. Thinning instructions.
5. Application instructions.
6. Material Safety Data Sheets (MSDSs).

3.2 APPLICATION

- A. Use wet methods, or wetting agents, and other work practices and engineering controls to prevent creation of visible asbestos emissions during abatement and handling of ACM.
- B. Perform personal air monitoring in accordance with 29 CFR 1926.1101(f) including sampling necessary to complete initial exposure assessments.
- C. The Contractor shall ensure an Asbestos Competent Person is on site anytime ACM is disturbed, removed, packaged, excavated, handled, loaded, hauled, or unloaded.
- D. The Contractor's Asbestos Competent Person shall perform documented inspections of the ACM work areas and adjacent areas daily during disturbance, excavation, handling, hauling, loading, unloading or placement of ACM waste. If there is visual evidence of asbestos contamination (e.g. spills of ACM waste) outside the demarcated ACM waste handling work areas, the Contractor shall take immediate action to abate the hazard, as described in the Contractor's ACM Removal and Handling Work Plan. The incident shall be reported immediately to the Construction Manager.

3.3 REMOVAL

- A. Removal Procedures of ACM TSI:
 1. Wet all ACM to be removed, or components or sections to be removed with ACM in place, with amended water solution and maintain wet until placed into disposal containers, double-bag in disposal bags, or sealed in 2 layers of sheeting.

2. Wrap large components removed intact in 2 layers of sheeting, secure with tape and properly label in accordance with OAC 3745-20-05(C)(1) and 29 CFR 1926.1101.
3. All piping (less than 12 inches in diameter) insulated with ACM may be removed with ACM in place. Wrap the piping in manageable sections with 2 layers of plastic sheeting, maintaining wet until wrapped. Use glovebags to remove ACM from each end of the section of pipe to be cut. Seal the exposed ACM with plastic and tape. Wet-brush and sponge, or clean the pipe by an equivalent method, the surfaces from which ACM has been removed. Double bag and seal. After the glove bag is removed, cut the pipe in the area that has been stripped of asbestos. Label the section of pipe that is wrapped, yet containing ACM, and the bag containing the glove bagged ACM in accordance with OAC 3745-20-05(C)(1) and 29 CFR 1926.1101.
4. Remove ACM from pipes that are larger than 12 inches in diameter by stripping of ACM in glove bags or mini-containments. Double bag the glove bag and contents; seal and label the bags in accordance with OAC 3745-20-05(C)(1) and 29 CFR 1926.1101. Size reduce the stripped piping as required.
5. Handle ACM with sharp-edged components as specified in this Section.
6. To remove any remaining ACM from stripped pipes or components, wet-brush and sponge, or clean by an equivalent method, the surfaces from which ACM has been removed in order to remove all visible ACM residue.
7. Pipes that exceed the WAC for the OSDF shall be cut into lengths as directed by the Construction Manager.
8. Pipes that are meet the WAC for the OSDF shall be size reduced into lengths to meet the requirements of the IMPP.
9. The Construction Manager will inspect the work area at the completion of work for any visible debris.

B. Removal of 13.2 kV Power Feeder Cables (includes fireproofing tape in manholes and cable):

1. Confined space entry will be required for removal of feeder cables within manholes and requirements are stated in Part 8 of this Contract.
2. Use wetting agents to ensure there are no visible emissions of asbestos fibers.
3. Wrap the fireproofed feeder cable in 2 layers of sheeting and secure with tape.
4. Remove friable ACM located at each end of the cable located within the electric manholes using a glove bag. Leave a length of cable exposed in the manhole so that the remaining cable can be pulled out of the conduit using the exposed end.
5. Cut the feeder cable and remove from the manhole.
6. Remove wrapped or bagged ACM from the manhole.
7. Clean the manhole using a HEPA vacuum to remove any remaining asbestos debris.
8. The Construction Manager will inspect the wrapped section to ensure the integrity of the wrap and the absence of radiological contamination.
9. Label wrapped sections in accordance with OAC 3745-20-05(C)(1) and 29 CFR 1926.1101.
10. The Construction Manager will visually inspect the manhole to ensure that all asbestos containing debris has been removed.
11. Using wet methods or amended water, remove the remaining feeder cable by use of pulling equipment.
12. Wrap the feeder cable in plastic shrink film or sheeting and then place into designated container.
13. Label wrapped sections in accordance with 29 CFR 1926.1101.
14. Clean the pulling area and manhole using a HEPA vacuum.

15. After the cable has been removed, the Construction Manager will perform an inspection of the work area for visible debris.

C. Removal of Below-grade Piping Containing Asbestos Gaskets:

1. When possible, do not expose gasket by breaking or cutting the flange.
2. If a gasket becomes exposed by breaking or cutting the flange at the gasket, is visibly deteriorated, and is unlikely to be removed intact, perform glove bag removal as described in 29 CFR 1926.1101 (g)(5)(ii).
3. If a gasket becomes exposed by breaking or cutting the flange at the gasket is able to be removed intact, remove the gasket and immediately place in a disposal container. Scrape any residue using wet methods.
4. Lock down any visible gasket material by saturating the material with lockdown, applied with a garden sprayer or equivalent method.
5. If size reduction is necessary and gasket material is exposed, seal the flange area with 2 layers of sheeting and duct tape.
6. Size reduce piping at lengths so that the flange where the gasket material is located is undisturbed.
 - a. Size reduce into lengths as directed by the Construction Manager when the piping exceeds the waste acceptance criteria (WAC).
 - b. Size reduce into lengths less as specified in the IMPP when piping meets WAC.
 - c. Size reduce if piping exceeds the maximum diameter accepted at the OSDF as described in the IMPP.
 - d. Size reduce perpendicular to the run of pipe without breaking or cutting the gasket.
7. At the completion of work, the Construction Manager will inspect the work area for any visible/exposed debris.

D. Removal of Asbestos Containing Mastic-coated Piping:

1. Remove mastic-coated piping in accordance with OSHA requirements for Class II work.
2. Thoroughly wet mastic with amended water.
3. Size reduce the piping inside of the excavation using equipment that will minimize generation of airborne fibers.
 - a. If piping is Above WAC, size reduce and dispose in accordance with Section 02205.
 - b. If piping is designated as RCRA, size reduce and dispose in accordance with Section 02205.
 - c. If piping meets WAC, size reduce in accordance with the IMPP.
4. Size reduce pipes that are greater than 12 inches in diameter to meet the OSDF WAC using methodology to prevent generation of friable asbestos fibers.
5. Encapsulate both ends of each section of piping and all other locations where damage to the mastic is visible.
6. Double bag and seal any ACM mastic that becomes dislodged from the piping in 6-mil asbestos bags.
7. Label according to OSHA 29 CFR 1926.1101.
8. At the completion of work, the Construction Manager will inspect the work area for any visible debris.

E. Removal of Concrete Encased Transite (transite conduit):

1. Removal of transite encased in concrete is generally OSHA Class II work, with the following exceptions.
 - a. Class I work practices may be applicable if the condition of the material is friable, or;
 - b. if the method used for removal causes material to become friable.
2. Thoroughly wet concrete/transite material with amended water.
3. Remove electrical cable, if present, using a cable puller.
4. Remove and size reduce concrete/transite material to meet OSDF WAC using methodology to minimize or prevent generation of friable asbestos.
5. Encapsulate both of the open ends of the transite.
6. Transite protruding beyond the concrete shall be double wrapped and sealed with sheeting.
7. The Construction Manager will inspect the work area at the completion of work for visible debris.

F. The Contractor shall use the following methods for excavation of previously removed ACM that was buried for disposal:

1. The Contractor's Asbestos Competent Person shall walk the work area and identify ACM visible at the surface before excavation, at least once a day during excavation and/or placement, and at the end of the shift.
2. Wet methods or wetting agents shall be used during handling, packaging, and loading of ACM, or soil or debris containing ACM.
3. Care shall be taken so that the friable ACM does not break or crumble during handling and so that non-friable ACM is not handled in such a manner that it becomes friable.
4. Encapsulate the exposed surfaces of broken transite panels that are segregated from the soil or debris and stacked on pallets.
5. Apply surfactants or encapsulants during size reducing of any large pieces of ACM to meet the OSDF WAC physical size criteria.
6. Do not leave ACM exposed at the surface of the stockpile or OSDF at the end of the work day.
7. Exposed ACM during excavation shall be covered with soil at the end of the work day. Exposed ACM during excavation may be locked down in lieu of covering with soil if work will resume in that area within 36 hours.
8. Friable ACM that was previously removed and then buried for disposal shall be handled as follows:
 - a. Wet with amended water (water mixed with surfactant) or encapsulate, and separate from the impacted material.
 - b. Wrap friable ACM components meeting the OSDF WAC physical size criteria and large pieces removed intact in 2 layers of sheeting, secured with duct tape, and labeled in accordance with OAC 3745-20-05(C)(1) and OSHA 29 CFR 1926.1101. Multiple pieces may be grouped together before wrapping, provided WAC physical size criteria is still met.
 - c. Double bag and seal pieces of friable ACM not conducive to wrapping in a 6-mil polyethylene bag. Label in accordance with OAC 3745-20-05(C)(1) and OSHA 29 CFR 1926.1101.

- d. Handle friable ACM with sharp-edged components (e.g. nails, screws, metal lath, tin sheeting) capable of tearing the polyethylene bags or sheeting in one of the following ways:
 - e. Pad or wrap and secure the sharp-edge components in a manner to prevent tearing of the polyethylene, then wrap or bag in accordance with this Section.
 - f. Place into polyethylene-lined containers (i.e. fiberboard boxes or drums). Metal containers are not allowed.
 - g. The polyethylene liner shall be sealed prior to sealing the container. The container shall be labeled in accordance with OAC 3745-20-05(C)(1) and 29 CFR 1926.1101.
 - h. Segregate wrapped, bagged, or containerized, friable ACM, from other excavated material and accumulate at the Special Materials Transfer Area. When a full, segregated load is accumulated, it shall be loaded and hauled to the OSDF. Loads shall be prepared and secured to prevent any visible emissions, load loss, and spillage or leakage of liquids.
9. Handle non-friable ACM as follows:
- a. Wet transite or other non-friable ACM with amended water to reduce potential for release of fibers.
 - b. Manually (by hand) remove pieces of transite or other non-friable ACM larger than 1 foot in any direction.
 - c. Stack large, intact pieces of transite or other non-friable ACM on pallets and wrap the entire stack in 2 layers of sheeting.
 - d. Bag smaller pieces of transite or other non-friable ACM not conducive to wrapping in 2 layers of sheeting.
 - e. Incidental pieces of transite or other non-friable ACM less than 12 inches in maximum dimension contained in soil and soil-like material or debris can be placed in the OSDF as Category 1 (soil and soil-like) or Category 2 material without segregation.
 - f. Avoid excessive breakage of the transite or other non-friable ACM during manual removal or during use of heavy equipment in the area.
 - g. Cover soil or debris containing non-friable ACM, which is temporarily staged in a stockpile, with 6 inches of soil that is visually free of ACM at the end of the day.
10. The Construction Manager will inspect the area at the completion of work for visible debris.

END OF SECTION

SECTION 02216
WASTE CONTAINERIZATION

PART 1 GENERAL

1.1 SCOPE

This Section provides the requirements for containerizing materials to be dispositioned at the Special Materials Transfer Area (SMTA).

1.2 REFERENCES

- A. Title 49, Code of Federal Regulations (CFR), Parts 106-199.

1.3 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be in accordance with Part 8.

1.4 SUBMITTALS

- A. Manufacturer's specification sheets for container scales.
- B. Scale calibration data.

1.5 QUALITY CONTROL REQUIREMENTS

- A. Notify the Construction Manager prior to any containerization activities. The Construction Manager shall be present at all times during all containerization activities.
- B. Verify and document current calibration data for equipment requiring calibration. Maintain current calibration data records on site.
- C. Store and handle containers in a manner that maintains the integrity of the container and keeps it free from damage.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide cribbing material to facilitate loading and lifting of containers.
- B. Provide 20-mil Herculite, as specified in Section 02205, for spill control.
- C. Provide tools for preparing containers and fastening lids.

2.2 EQUIPMENT

- A. Provide equipment required for the movement of the containers. Equipment must meet pre-use and inspection requirements in accordance with Part 8.
- B. Provide portable scales for weighing containers.

PART 3 EXECUTION

3.1 GENERAL

- A. Containers, associated hardware, absorbent material and liners will be provided and delivered to the SMTA by the Construction Manager. The typical container used for bulk loading of soil will be top-loading and have approximate dimensions of 6.5'H x 8'W x 20'L. These containers shall have a weight limitation of approximately 42,000 pounds gross weight and a freeboard requirement of no more than 3".
- B. Notify the Construction Manager 14 days prior to initial containerization activities to ensure the delivery of containers. After initial delivery, allow 7 days for delivery of additional containers.
- C. Comply with weight limitations of containers provided, as directed by the Construction Manager.
- D. Do not fill containers during periods of rain, snow, sleet, hail, or heavy fog. Close, cover or arrange the containers in a manner that will prevent water from entering or accumulating in them.
- E. Containers may be considered a confined space. Contact the Construction Manager for monitoring prior to entering any container.

3.2 PREPARING CONTAINER FOR LOADING

- A. Prior to filling, prepare containers at the SMTA or an area designated by the Construction Manager as follows:
 - 1. Remove lids per manufacturer's recommendations.
 - 2. Install liners as directed by the Construction Manager.
 - 3. Repair any holes in the liner using duct tape.
 - 4. Install absorbent material as directed by the Construction Manager.
 - 5. Secure absorbent material in place using duct tape.
- B. Notify the Construction Manager for documentation of the container preparation prior to loading.

3.4 FILLING CONTAINER

- A. Upon approval of container preparation by the Construction Manager, transport containers from the SMTA to the excavation area.
- B. Stage container in the buffer area to facilitate loading. Use cribbing as necessary to facilitate clean loading and assist in lifting the container following loading.
- C. The Construction Manager will visually monitor the material for free liquids prior to containerization. Material moisture content shall not result in "bleeding" of liquids.
- D. Load material into the container in a manner that prevents spillage into the buffer area or onto the container exterior (e.g. place Herculite apron over container to protect exterior).
- E. Fill container to maximize material volume while complying with container weight limits and maximum 3" freeboard requirement.
- F. Remove all visible material that accumulates on the container exterior and place this material, along with any material that may have accumulated in the buffer area, back into the area from which it was excavated.
- G. Prior to placing absorbent material on top of containerized material, allow the Construction Manager the opportunity to sample the material.
- H. Place additional absorbent materials on top of the waste as directed by Construction Manager.
- I. Set the lid on the container while in the buffer area.
- J. The Construction Manager will perform radiological monitoring on containers prior to release from the buffer area, as required in Part 8. If radiological contamination is found on the exterior of the container, clean the container exterior within the buffer area as directed by the Construction Manager.
- K. Upon release from the buffer area, weigh the container as needed to ensure compliance with container weight limitations.
- L. Haul the loaded container from the buffer area to the SMTA, using equipment approved by the Construction Manager.
- M. Prior to securing the container lid in the SMTA, notify the Construction Manager to perform a final visual inspection of the container and its contents.
- N. Secure the container lid in the SMTA using fasteners and any special tools provided by the Construction Manager.
- O. The Construction Manager will remove containers from the SMTA for final shipping preparation by others.

END OF SECTION

SECTION 02275
 EROSION AND SEDIMENT CONTROL AND SURFACE WATER MANAGEMENT

PART 1 GENERAL

1.1 SCOPE

A. This Section includes, but is not limited to, the following:

1. Installation of erosion and sediment control measures for work included in this contract, including the Tank Farm Settling Basin and related appurtenances.
2. Maintenance of existing and new erosion and sediment control measures installed by this Contract, including removal of all temporary erosion control facilities.
3. Management of surface water in construction and excavation areas, including pumping of surface water to the Tank Farm Settling Basin during general excavation and pumping of volatile organic compound (VOC)-contaminated water to portable tanks.
4. Modification of existing storm sewer system.
5. Installation and maintenance of runoff/runoff controls along the perimeter of the project boundary.
6. Protection of the unsaturated sands and gravels of the Great Miami Aquifer (GMA) from runoff within the excavation areas, including installation and maintenance of runoff controls.
7. Management of area for precertification.
8. Stabilization of disturbed excavation areas or stockpiles.
9. Inspection requirements.

1.2 RELATED SECTIONS AND DOCUMENTS

- A. Section 02100 – Surveying.
- B. Section 02205 – Impacted Material Excavation.
- C. Section 02206 – Earthwork for Remediation.
- D. Section 02215 – Trenching and Backfilling.
- E. Section 02930 – Vegetation.
- F. Surface Water Management Plan (SWMP) for the Remediation of Areas 3A and 4A, Document No. 20800-PL-0003, Rev. 0.
- G. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, current edition.
- B. American Association of State Transportation Officials (AASHTO) M36, Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains, current edition.
- C. Title 40, Code of Federal Regulations (CFR), Part 261, Hazardous Waste Management System, Identification and Listing of Hazardous Waste, current edition.
- D. State of Ohio, Department of Natural Resources (ODNR), Rainwater and Land Development, Ohio's Standard for Stormwater Management Land Development and Urban Stream Protection, current edition.
- E. State of Ohio, Department of Transportation (ODOT), Construction and Material Specifications, current edition.

1.4 SUBMITTALS

- A. For each product proposed for use, submit the following:
 - 1. Manufacturer's product data and recommended methods of installation and maintenance.
 - 2. Certification from manufacturer that the product meets the material requirements of this Section, including test results.
 - 3. Material Safety Data Sheet (MSDS), if applicable.
- B. For dewatering pumps to be used within the excavations during excavation activities to reach design grade, submit the following:
 - 1. Certified pump curves showing performance characteristics with pump and system operating point plotted, including minimum and maximum flow.
 - 2. Engine type, power, and operating speed, including operational characteristics at full and partial loads.
- C. Prepare and submit a Surface Water Management Plan (SWMP) that meets the requirements of the SWMP for the Remediation of Areas 3A and 4A, as identified in this Section. Organize the SWMP to include the following, at a minimum:
 - 1. Descriptions of the surface water management and erosion and sediment control measures to be implemented during excavation of Above-WAC and RCRA Hazardous areas and throughout the duration of this Contract.
 - 2. Methods for installing and maintaining surface water management and erosion and sediment control measures until completion of Work.
 - 3. Plan drawings illustrating the location and sequencing of the surface water management and erosion and sediment control measures.

4. Plan drawings illustrating the location of detention areas, including volumes, and limits of active excavation draining to detention areas.
5. Sequencing and timing of storm sewers to be plugged/abandoned and storm sewers to be saved for use during excavation. State when, where, and how each sewer will be plugged/abandoned, including any modifications to existing catch basins and manholes.
6. Methods and measures for plugging pipes daylighting at the excavation boundary.
7. Methods for collection and discharge of surface water from the excavated areas, and measures to minimize erosion of the excavated areas during work progress, inclement weather and at the end of each work day, as well as during winter shutdown. Include details showing hose anchor configuration at the input to the Tank Farm Settling Basin.
8. Methods and measures for collection of VOC-contaminated water from areas as shown on the Drawings, including the Soil Treatment Area.
9. Methods and measures for penetrations into existing catch basins and manholes.
10. Methods and measures for protecting the GMA from runoff from excavation areas, including protective measures at the top of excavation slope and on benches.

D. Contractor's records of inspection of erosion and sediment control measures as specified herein shall be submitted monthly upon completion of the inspection report.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping, fittings, and storm sewer plugs to project site in a clean and protected condition. Exercise care in handling and storage of piping materials and prefabrication so that contamination does not occur from moisture, grease, dirt, or foreign matter.
- B. Remove from the project site any material that has been broken, cracked, or otherwise damaged before or after delivery or that has failed to meet required tests.

1.6 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Furnish silt fence in accordance with ODNR, composed of, at a minimum, strong rot-proof polymeric fibers formed into a woven fabric which has fabric and fence post properties as shown on the Construction Drawings.
- B. Furnish dumped rock fill in accordance with ODOT Item 601 for Type D requirements, or crushed concrete approved by the Construction Manager.
- C. Furnish non-woven geotextile fabric in accordance with ODOT Item 712 for Type A requirements.

- D. Furnish erosion control blanket in accordance with ODOT Item 673 for Type E requirements.
- E. Furnish metal staples specifically made to anchor erosion control blankets in accordance with ODOT Item 667.
- F. Furnish dust suppression/crusting agent meeting the following requirements:
 - 1. The dust suppression/crusting agent shall be a pine sap emulsion comprised of a 100% organic emulsion produced from naturally occurring resins (pine sap) or a tacifier approved by the Construction Manager. The dust suppression/crusting agent shall not be comprised of chloride, lignosulfonate, petroleum, or asphaltic type emulsions. The dust suppression/crusting agent must provide dust suppression and surface stability for exposed disturbed and undisturbed soils. The dust suppression/crusting agent shall be compatible with application via a hydro seeder. It must not require intense cleaning of equipment after application. Once cured, the dust suppression/crusting agent shall be non-tracking (i.e., will not stick to boots or tires).
 - 2. The dust suppression/crusting agent shall have no hazardous characteristics of ignitability, corrosivity, reactivity, or toxicity as defined in Title 40 CFR Part 261 for a hazardous waste in either its preapplied or cured states.
 - 3. The dust suppression/crusting agent shall have a flash point greater than 200 °F. The dust suppression/crusting agent shall be neither a flammable nor combustible liquid per ODOT definition. The dust suppression/crusting agent must not be susceptible to significant deterioration from exposure to the elements, including sunlight.
- G. Furnish storm sewer components meeting the following requirements:
 - 1. Reinforced Concrete Pipe: ASTM C76, Class III, Wall B, with bell and spigot joints.
 - 2. Corrugated Metal Pipe and Fittings:
 - a. Storm drain pipe shall be galvanized steel, AASHTO M36, 14 gauge thickness.
 - b. Coupling bands shall be corrugated, galvanized steel, AASHTO M36. Connecting bands shall be mechanical ring type.
 - c. Culvert pipe shall be corrugated steel, AASHTO M36, 14 gauge thickness. Pipe joints shall be mechanical ring type.
- H. Furnish 3,000 gal. portable tank to hold water contaminated with volatile organic compounds (VOCs).
- I. Furnish watertight solid lids for catch basins and manholes as manufactured by Neenah, or equivalent.

PART 3 EXECUTION

3.1 GENERAL

- A. Construct and maintain erosion and sediment control measures as specified in this Section, the Contractor's approved SWMP, and as shown on the Drawings. Maintain existing erosion and sediment control facilities and measures in accordance with this Section.

- B. Minimize runoff into disturbed excavation areas by grading the surrounding area away from the disturbed area and/or by diversions as shown on the Drawings.
- C. As the excavation progresses, excavate sumps at resulting low points used for water collection of perched and/or surface water. Do not penetrate to within 5 feet of the GMA with sump excavations.
- D. Water collected from a 10-yr, 24-hr or lesser storm event (precipitation not to exceed 4.1-inches of rainfall) within excavations and trenches for below design grade utility removal shall be pumped to the Tank Farm Settling Basin. Collected water shall be pumped down to a depth of less than one foot remaining in the bottom of the excavation within 3 days of the last rainfall.
- E. Install surface water controls at the Soil Treatment Area to prevent runoff and to minimize standing water within the area.
- F. Pump VOC-contaminated water collected within the Plant 6 basement and other areas indicated on the Drawings, including the Soil Treatment Area, to a portable tank for transport by Fluor Fernald. Locate portable tank as directed by the Construction Manager.
- G. Plug storm sewers at the excavation boundary prior to removal of storm sewer piping located within the excavation area. Plug storm sewer system in such a manner to minimize water collected in an abandoned system. After storm sewer system has been plugged, cover existing catch basins and manholes that drain to the abandoned line with watertight solid lids.
- H. Remove erosion and sediment control measures after the disturbed excavation areas are stabilized as specified in Section 02930, when directed by the Construction Manager.

3.2 SILT FENCES

- A. Install silt fence at locations down-gradient of areas to be disturbed until Above WAC and RCRA hazardous areas have been excavated and associated drainage and erosion control structures have been established. Remove accumulated sediment when deposition reaches one-half the height of the silt fence or sooner if accumulated sediment prevents adequate performance of silt fence; remove accumulated sediment within 24 hours of discovery. Sediment shall be dispositioned as specified in Section 02205.
- B. Install breaks and overlaps in silt fence to allow equipment access to construction areas.

3.3 EROSION CONTROL BLANKETS

- A. Install and maintain erosion control blankets, at locations shown on the Drawings and as required by the Contractor's approved SWMP in accordance with manufacturer's recommendations.
- B. Space staples at 12 inches on center along top edge and invert of ditches and 24 inches on center at midpoint of slopes.

3.4 PIPE INSTALLATION

- A. Trench and backfill for pipe installation in accordance with Section 02215. Backfill with material excavated from the trench.
- B. Install butyl joint sealant for reinforced concrete pipe. Taper and plug holes in the pipe used for handling and laying with rubber stoppers or mortar after installation.
- C. Install mechanical clamp rings at the joints of corrugated steel pipe according to the pipe manufacturer's recommendation.
- D. Survey newly installed pipes in accordance with Section 02100.

3.5 MANHOLE/CATCH BASIN MODIFICATION

- A. Modify existing catch basins and/or manholes as designated on the Construction Drawings. Excavate around structure to be modified using a 2H:1V slope or by using other shoring methods in accordance with Part 8 as approved by the Construction Manager. Backfill and compact in accordance with Section 02215. Backfill with material removed from excavation activities.
- B. Seal joint opening using cement mortar.
- C. Fill annular space between pipe and manhole / catch basin with grout to prevent leakage and to form a neat connection after installation of pipe to the proper lines and grades as shown on Construction Drawings.

3.6 TANK FARM SETTLING BASIN AND DITCHES

- A. Remove accumulated sediment and debris from the Tank Farm Settling Basin and ditches. In no case shall sediment build up to a depth greater than 10 inches in the Tank Farm Settling Basin or to a depth greater than one-half the constructed depth of the ditch.
- B. Remove sediment and debris as specified in Section 02205.

3.7 DUMPED ROCK FILL

- A. Install and maintain dumped rock fill as shown on Drawings.
- B. Contractor may use crushed concrete in locations as approved by the Construction Manager.

3.8 GMA PROTECTION

- A. Grade benches above GMA breaches as shown on the Drawings to prevent runoff into the GMA.

- B. Size and locate pumps along benches above the GMA such that no water from within the excavation area shall overflow into the GMA from a 10-yr, 24-hr or lesser storm event.
- C. For excavations extending to within 5-feet of the GMA elevation shown on the Drawings, maintain less than one foot of standing water in the excavations at all times by pumping water to the Tank Farm Settling Basin.
- D. Backfill over the GMA in accordance with Section 02206.

3.9 PRECERTIFICATION

- A. All pipes that daylight at the excavation face shall be plugged at the excavation face prior to precertification.
- B. Install runoff controls along perimeter of precertification boundary, as shown on the Drawings, to prevent surface water from non-certified areas from flowing into precertified areas.
- C. During precertification, direct drainage from precertified areas to the east or north to Paddys Run outfall locations as shown on the Drawings. Notify Construction Manager prior to pumping to Paddys Run outfall locations.
- D. Maintain surface water management within the area to be precertified in accordance with this Section until precertification is complete.

3.10 INACTIVE EXCAVATION AND STOCKPILE AREAS

- A. Forty-five calendar days shall be the maximum time that disturbed excavation areas can be left in an exposed condition without stabilization. If a disturbed area shall not be worked for 45 calendar days or more, the soils shall be stabilized within 7 calendar days of excavation by one of the following methods:
 - 1. For disturbed excavation areas that may be disturbed within 2 years and/or needing effective erosion control immediately, use dust suppression/crusting agent as specified in this Section.
 - 2. For disturbed excavation areas that may be disturbed within 2 years but do not have significant potential of spreading contamination, apply interim seeding as specified in Section 02930.
 - 3. For disturbed excavation areas that will not be disturbed for more than 2 years, apply permanent seeding as specified in Section 02930.
- B. Forty-five calendar days shall be the maximum time that stockpile areas can be left in an exposed condition without stabilization. Stockpile areas that are to be inactive for 45 calendar days, or more, shall be stabilized within 7 calendar days as specified in this Section.
- C. Apply dust suppression/crusting agent according to manufacturers directions. Unless specified otherwise by the manufacturer, dilute concentrate pine sap emulsion to ratio of 4 parts to 1 part concentrate. Apply diluted solution at the rate of 2,500 gallons per acre.

- D. Dilution ratio and application rate are subject to further adjustment at direction of Construction Manager to optimize performance of dust suppression/crusting agent.

3.11 FIELD QUALITY CONTROL

- A. Before installation, clean all dirt and foreign materials from inside of all pipe and manhole components. After installation but before backfilling, inspect for broken or cracked pipe, fittings and manhole components. Replace all defective pipes, components, or workmanship.
- B. Verify that pipe has been installed to lines and grades as shown on Drawings.

3.12 INSPECTION

- A. Inspect erosion and sediment control measures to evaluate effectiveness and need for maintenance of the control measures. Any repairs to the erosion and sediment control measures shall be completed within 24 hours of problem discovery. Inspections shall occur at the following minimum frequencies:
 - 1. Weekly.
 - 2. Daily after rain events exceeding 0.5 inches.
 - 3. At least daily during prolonged rainfall events.
- B. File records of inspections at Contractor's site office and submit them monthly to the Construction Manager.
- C. The inspection report shall summarize the scope of the inspection, name of the inspector(s), inspection date, observations relating to the implementation of the erosion and sediment control measures, destination of pumping ponded water, estimated quantity of ponded water and corrective action measures, if any, that are required. The report shall indicate if any areas are not in compliance or contain a certification that control measures are effective and in compliance with this Section.

END OF SECTION

DIVISION 15 MECHANICAL

<u>SECTION</u>	<u>DESCRIPTION</u>	<u>PAGES</u>
15160	Excavation Dewatering Pump(s)	8

Prepared By: _____
James C. Reynolds

Approved By: _____
Patrick O. Bryan, PE

Date: 03/31/00
Rev. J

SECTION 15160
EXCAVATION DEWATERING PUMP(S)

PART 1 GENERAL

1.1 SCOPE

This Section includes the requirements for manually controlled dewatering transfer trash pump(s), engine(s), and accessories.

1.2 RELATED DOCUMENTS

- A. Part 6 - Statement of Work.
- B. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings, current edition.

1.4 PERFORMANCE

- A. Data for pumps shall be obtained from the Contractor's approved surface water management plan.
- B. Data for pumps located in the precertification buffer areas is provided in Attachment A.

1.5 SUBMITTALS

- A. Provide submittals as required in Part 6. Unless specified otherwise, submittals shall be made to the Construction Manager for review and approval.
- B. Product Data: Certified pump curves showing performance characteristics with pump and system operating point plotted, including minimum and maximum flow.
- C. Completed Pump and Engine Data Sheet(s) based on given conditions (See Attachment B – Pump Data Sheet).
- D. Engine Product Data: Provide engine type, fuel capacity and consumption, power, and operating speed. Include operational characteristics at full and partial loads.

- E. Certificates: Certificates of conformance to specification requirements, and certificates guaranteeing performance at design point.
- F. Installation instructions, start-up and troubleshooting instructions, operational and maintenance data, lubrication instructions, and spare parts list.
- G. Test results – Tabular form including operational tests.
- H. Transfer Pump Plan: The Excavation Work Plan shall include a section on transfer pump installation and operation, which shall include, as a minimum, the following:
 - 1. installation layout of the transfer pump(s),
 - 2. methodology to be used for sediment removal from suction inlet and provision for access to pump(s) for maintenance, service, and refueling,
 - 3. methodology to be used for routing of discharge lines from pump(s) to discharge, including offsets to miss obstructions and pipe protection required for any vehicular and pedestrian traffic,
 - 4. structure or apparatus on which pump(s) will sit in operating position,
 - 5. weather protection of pump and driver to allow all-weather start and operation, and
 - 6. accessories and appurtenances required to provide a complete working system.

1.6 QUALITY ASSURANCE

- A. The Excavation Work Plan shall include system operability testing criteria which shall be submitted to the Construction Manager for approval.
- B. Tests will be witnessed by the Construction Manager. Provide testing procedures 15 days before the test.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry place and protect from weather before shipment, during transit, and at delivery.
- B. Tag and deliver loose items in standard commercial packages. Protect the package from the weather, from climate conditions including temperature and humidity variations, and from dirt, dust, and other contaminants that could adversely affect assembly and operation.

1.8 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Multiquip, Wacker, or equal.

2.2 EQUIPMENT

- A. General – Air-cooled gasoline engine driven centrifugal trash pump for placing on grade at point of dewatering. Pump shall be self-priming for the suction lift required. Pump driver shall be manual pull start. Provide only full size gate or ball valve on pump discharge. Suction line shall have foot valve capable of meeting the same flow requirements as the pump.
- B. Driver Requirements.
 - 1. Driver shall be air-cooled, 4-cycle, single cylinder, gasoline engine.
 - 2. Engine size in hp shall be selected to serve the driven equipment over its full design performance range.
 - 3. Engine shall be integrally mounted to the pump and shall be standard for this application.
 - 4. Oil Alarm: Provide automatic lubrication monitoring system to shut engine down if the oil level is insufficient for safe operation.
- C. Volute shall be self-cleaning and positive priming.
- D. Pump(s) and driver(s) shall be provided with wraparound tubular steel frames for portability and protection.
- E. Seals:
 - 1. Watertight integrity shall be maintained between mating surfaces with standard gaskets or O-ring seals.
- F. High strength aluminum housing with cast iron wearable parts.

2.3 FABRICATION

- A. Clean the pump(s) of all dirt, dust, grease, grime, weld spatter, and other foreign material before shipment. Seal open-end connections to prevent the entrance of foreign material.
- B. Factory prime and paint all surfaces subject to corrosion.

2.4 LABELING

- A. Equipment Identification: Provide with permanently attached stainless steel nameplates indicating equipment name, number, model number, and rated capacity on the pump(s). Lettering shall be a minimum of 3/8 inch high and shall be stamped.

PART 3 EXECUTION

3.1 ERECTION/INSTALLATION/APPLICATION

- A. Provide installation and utilization of the equipment in accordance with the manufacturer's instructions.
- B. Provide a copy of the manufacturer's installation instructions, start-up and troubleshooting instructions, operation and maintenance data, lubrication instructions, and spare parts list at the site.

3.2 QUALITY CONTROL

- A. Perform an acceptance operating test after installation. If results are unsatisfactory, adjust or replace the equipment to meet specification requirements and retest the equipment.
- B. Notify the Construction Manager of testing and inspection activities at least 24 hours before the start of all tests and inspections.
- C. The Construction Manager shall approve the testing procedure before testing begins.
- D. Demonstrate ability to meet operating point as shown on pump curve. Vibration shall be within the manufacturer's acceptable range.

3.3 TURN OVER

- A. Upon completion of project, pump(s) shall be turned over to the Construction Manager in good working condition.

END OF SECTION

ATTACHMENT A
"P-119 PUMP DATA SHEET"

PUMP DATA SHEET

PROJECT TITLE: Remediation of Areas 3A and 4A							TASK ORDER:	
PUMP NAME:							QUANTITY: 19	
TYPE PUMP: Centrifugal trash, self-priming for the required suction lift							DRAWING NUMBER	
TYPE DRIVER: Manual pull-start Air-cooled gas engine			SUPPLY W/PUMP				YES X NO	
MANUFACTURER AND MODEL NO.:						EQUIP NO.: P-119		
OPERATING CONDITIONS								
FLUID PUMPED: Stormwater			AT A PUMPING TEMPERATURE OF: 60 degrees F					
SPECIFIC GRAVITY: 0.9991 AT 60° F		AT P.T.			VISCOSITY: 1.12		AT P.T.	
SOLIDS IN FLUID: WT%		DENSITY:			SIZE:		ABRASIVE:	
NATURE OF SOLIDS:					0.25611 FLUID VAPOR PRESSURE: lbs/in ²		FT. of FLUID @ P.T.	
DESIGN CAPACITY: 75 GPM AT 45 FT. TH at P.T.			DESIRED RANGE: GP M TO GPM					
SUCTION PRESS: 11 FT. PSIG			DISCHARGE PRESS: 34 FT. PSIG			NPSH AVAIL: 21.96 at P.T.		
PUMP SPECIFICATIONS								
TYPE PUMP:						NO. STAGES: 1		RPM: 1750 max.
TYPE IMPELLER:						SIZE: IN.		MAX SIZE: IN.
EFFICIENCY AT DESIGN CAPACITY: (min)%			BHP @ DESIGN CAPACITY:			MAXIMUM BHP:		
TYPE BEARINGS:								
TYPE COUPLING:						LUBRICATION:		
TYPE OF SEAL:								
CONNECTIONS - SIZE & RATING								
SUCTION: 2 IN. LB.				DISCHARGE: 2 IN. Hose Conn.				
VENT: IN. LB.				DRAIN: IN.				
CONSTRUCTION MATERIALS								
RESTRICTIONS:								
CASING:				IMPELLER:				
SHAFT:				SHAFT SLEEVE:				
CASE RING:				IMP. RING:				
DISCHARGE ELBOW:				RELIEF VALVE:				
ENGINE DATA								
HP	RPM	CYCLE	PORTS	FUEL CAPACITY	RUN TIME	FILTER TYPE	MAX OPER TEMP	MANUFACTURER
NOTES: <ol style="list-style-type: none"> 1) Vendor shall complete data sheet as required. 2) Suspended solids (silt and clay-sized); some sharp grained fine to medium sand. 3) Connection shall have a 3-inch hose shank in a vertical orientation. Pump flanges, if used, shall be ANSI Class 125. 4) Provide pump with suction strainer sized to match pump's solids handling capability. 								

Date: 03/31/00
Rev: J

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ATTACHMENT B
"PUMP DATA SHEET"

PUMP DATA SHEET

PROJECT TITLE:							TASK ORDER:	
PUMP NAME:							QUANTITY:	
TYPE PUMP:							DRAWING NUMBER	
TYPE DRIVER:			SUPPLY W/PUMP					
MANUFACTURER AND MODEL NO.:						EQUIP NO.:		
OPERATING CONDITIONS								
FLUID PUMPED:				AT A PUMPING TEMPERATURE OF:				F
SPECIFIC GRAVITY:		AT 60° F		AT P.T.		VISCOSITY:		AT P.T.
SOLIDS IN FLUID:		WT%	DENSITY:		SIZE:		ABRASIVE:	
NATURE OF SOLIDS:					FLUID VAPOR PRESSURE:		FT. of FLUID @ P.T.	
DESIGN CAPACITY:			GPM AT		FT. TH at P.T.		DESIRED RANGE: GP M TO GPM	
SUCTION PRESS:			FT.	PSIG		DISCHARGE PRESS:		FT. PSIG
							NPSH AVAIL: at P.T.	
PUMP SPECIFICATIONS								
TYPE PUMP:						NO. STAGES: 1		RPM: 1750 max.
TYPE IMPELLER:						SIZE: IN.		MAX SIZE: IN.
EFFICIENCY AT DESIGN CAPACITY: (min)%				BHP @ DESIGN CAPACITY:		MAXIMUM BHP:		
TYPE BEARINGS:								
TYPE COUPLING:						LUBRICATION:		
TYPE OF SEAL:								
CONNECTIONS - SIZE & RATING								
SUCTION: 2 IN. LB.				DISCHARGE: 2 IN. Hose Conn.				
VENT: IN. LB.				DRAIN: IN.				
CONSTRUCTION MATERIALS								
RESTRICTIONS:								
CASING:					IMPELLER:			
SHAFT:					SHAFT SLEEVE:			
CASE RING:					IMP. RING:			
DISCHARGE ELBOW:					RELIEF VALVE:			
ENGINE DATA								
HP	RPM	CYCLE	PORTS	FUEL CAPACITY	RUN TIME	FILTER TYPE	MAX OPER TEMP	MANUFACTURER
NOTES: 1) Vendor shall complete data sheet as required. 2) Suspended solids (silt and clay-sized); some sharp grained fine to medium sand. 3) Connection shall have a 3-inch hose shank in a vertical orientation. Pump flanges, if used, shall be ANSI Class 125. 4) Provide pump with suction strainer sized to match pump's solids handling capability.								

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DIVISION 16

ELECTRICAL

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SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SCOPE

- A. This Section includes, but is not limited to, the following:
1. Circuit breakers.
 2. Disconnect switches.
 3. Combination magnetic motor starters.
 4. Selector switches, push-button switches and indicating lights.
 5. Receptacles.
 6. Relays.
 7. Conduit.
 8. Wire and cable.
 9. Instrument cable.
 10. Nameplates.
 11. Wire markers and cable tags.
 12. Wireway and auxiliary gutters.
 13. Splicing and termination components.
 14. Boxes.
 15. Supporting devices.
 16. Electrical testing.

1.2 RELATED SECTIONS

- A. Part 6 - Statement of Work.
- B. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. American National Standards Institute (ANSI):
1. ANSI C80.1, Rigid Steel Conduit (RGS) - Zinc Coated, current edition.
 2. ANSI C80.6, Intermediate Metal Conduit (IMC) - Zinc Coated, current edition.
- B. InterNational Electrical Testing Association (NETA):
1. NETA ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment, current edition.

- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code, current edition.

- D. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA AB 1, Molded Case Circuit Breakers and Molded Case Switches, current edition.
 - 2. NEMA ICS 1, Industrial Control and Systems General Requirements, current edition.
 - 3. NEMA ICS 2, Industrial Control and System Controllers, Contactors, and Overload Relays Rated Not More Than 2000 Volts AC or 750 Volts DC, current edition.
 - 4. NEMA ICS 4, Industrial Control and Systems Terminal Blocks, current edition.
 - 5. NEMA ICS 6, Industrial Control and Systems Enclosures, current edition.
 - 6. NEMA KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum), current edition.
 - 7. NEMA OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports, current edition.
 - 8. NEMA WD 1, General Requirements for Wiring Devices, current edition.
 - 9. NEMA WD 6, Wiring Devices - Dimensional Requirements, current edition.
 - 10. NEMA 250, Enclosures for Electrical Equipment (1,000 volts maximum), current edition.

- E. State of Ohio, Department of Transportation (ODOT): Construction and Material Specifications, current edition, except as supplemented or otherwise modified herein and/ or shown on the Drawings.

- F. Underwriters Laboratories Inc. (UL):
 - 1. UL 360, UL Standard for Safety Liquid-Tight Flexible Steel Conduit, current edition.
 - 2. UL 486A, UL Standard for Safety Wire Connectors and Soldering Lugs for Use with Copper Conductors, current edition.
 - 3. UL 510, UL Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape, current edition.
 - 4. UL 854, Service-Entrance Cables, current edition.
 - 5. UL 870, UL Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings, current edition.
 - 6. Electrical Construction Materials Directory, current edition.

1.4 SUBMITTALS

- A. Provide submittals as required by Part 6. Unless specified otherwise, submittals shall be made to the Construction Manager for review and approval.

- B. Submit the following after Notice to Proceed:
 - 1. Catalog sheets for all equipment and materials.
 - 2. All procedures and record forms for required testing.

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- C. Submit all test reports after completing of tests.

1.5 QUALITY ASSURANCE PROGRAM

- A. Work shall comply with NFPA 70. Use of conduit for equipment ground is prohibited.
- B. Products shall be listed in the UL Electrical Construction Materials Directory, for the purpose specified and indicated.

1.6 ENVIRONMENTAL AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Conduit:
 - 1. Rigid steel, heavy wall, galvanized conduit conforming to ANSI C80.1. Conduit shall be 1/2-inch diameter minimum.
 - 2. Liquid-tight flexible metal conduit conforming to UL 360. Conduit shall be 1/2 inch diameter minimum, 5 feet in length (maximum) unless indicated on the Drawings.
 - 3. Conduit connections shall be threaded.
- B. Wire and Cable: Single and multiconductor, 600 volt insulated copper conductor. Conductors for power and lighting branch circuits shall not be smaller than No. 12 AWG. Conductors No. 14 AWG and larger shall be stranded. Conductors for control shall not be smaller than No. 14 AWG stranded. Conductors for Class 1 remote-control and signal circuits shall be enclosed in cable and shall comply with NFPA 70. Power and lighting conductor insulation shall be rated 90 °C in accordance with NFPA 70 and shall be insulation Type THHN, THWN-2, XHHW, XHHW-2. Armored cable shall be for outdoor use with Al interlocked armor.
- C. Nameplates: shall be engraved, three-layer laminated plastic, 5/16-inch bold style, black letters on white background.
- D. Wire Markers and Cable Tags:
 - 1. Wire markers shall be single-conductor slip on, heat-shrinkable sleeve with typed or printed black letters on a white background. Wire markers shall be W. H. Brady Co. computer-printable "Bradysleeve" or approved equal.
 - 2. Cable tags shall be rectangular, flat, non-heat shrinkable tags with 1/8-inch-high letters. Cable markers shall be Raychem-type TMS or approved equal.

E. Wireway and Auxiliary Gutters:

1. General purpose, NEMA ICS 6, Type 3R enclosure with knockouts on bottom.
2. Size: As required.
3. Cover: Screw cover with full gasketing.
4. Fittings: UL 870, lay-in type with removable top, bottom, and side; captive screws.
5. Material: Carbon steel.
6. Finish: Rust-inhibiting primer coating with gray enamel finish.

F. Splicing and Termination Components:

1. Wire connectors, UL 486A, as applicable.
2. Insulation tape, UL 510.
3. Provide solderless terminal lugs, rated 75 °C minimum, on stranded conductors.

G. Boxes and Cover Plates:

1. Junction and Pull Boxes

- a. Size junction and pull boxes as indicated in accordance with NFPA 70, Article 370.
- b. Junction and pull boxes located indoors shall be code-gauge, galvanized sheet steel and shall be of welded construction with conduit knockouts or raceway openings and hinged or screwed covers as indicated. Type 3R, according to NEMA 250.
- c. Junction and pull boxes located outdoors shall be code-gauge, galvanized sheet steel and shall be of welded construction and have screwed, gasketed covers, and watertight hubs. Type 3R, according to NEMA 250.

2. Device and Outlet Boxes

- a. Device and outlet boxes shall be pressed steel, zinc, or cadmium coated in accordance with NEMA OS 1 unless otherwise indicated.
- b. Outlet boxes shall not be smaller than 4 inches octagonal by 1-1/2 inches deep and shall be provided with the proper size knockouts for the conduits intended. Unused knockouts shall remain closed or shall be sealed with knockout closures.
- c. Device or outlet boxes shall be of unit construction of a size required for the number of switches or outlets called for on the Drawings. No sectional device boxes shall be permitted.
- d. Surface-mounted outlet boxes for receptacles, switches, or similar devices shall be cast type.

H. Supporting Devices:

1. Support Channel shall be galvanized or painted steel.
2. Support hardware and accessories shall be corrosion resistant.
3. Supports shall be of all-welded construction.

2.2 EQUIPMENT

- A. Disconnect Switches - Fusible Switch Assemblies: NEMA KS 1, Type HD quick-make, quick-break, visible blade, load interrupter knife switch in Type 3R or 4 enclosures, NEMA 250, for outdoor use, with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F-870. Designed to accommodate Class R fuses. Terminals, minimum 75 degrees C rated.
- B. Combination Magnetic Motor Starters:
1. NEMA ICS 1, NEMA ICS 2, AC general purpose Class A magnetic starter for induction motors for the rated horsepower combined with a magnetic circuit breaker, NEMA AB 1, with instantaneous magnetic trip in each pole. Starter, circuit breaker, and control power transformer shall be in a common enclosure. Terminals, minimum 75°C rated.
 2. Provide externally operable handle interlocked to prevent opening of cover with circuit breaker in the ON position. Allow handle to be lockable in the OFF position.
 3. Contactor Coil Operating Voltage: 120 V, 60 Hz.
 4. Overload Relay: NEMA ICS 2, bimetal.
 5. Control Power Transformer: 120 V secondary, 50 VA minimum. Provide fused secondary of transformer, and ground unfused leg of secondary to enclosure.
 6. Enclosure: mounted in NEMA ICS 6, Type 4X, outdoor cabinet as indicated.
 7. Heater elements shall be included, as required, for the described service conditions.
 8. Two auxiliary contacts (electrically dry), one each, normally closed and normally open, in addition to the hold-in contact, shall be provided.
- C. Selector Switches:
1. Enclosure, NEMA ICS 6, Type 3R or 4.
 2. Three-position, spring return, push-button, and indicating lights as indicated.
- D. Receptacles - Convenience Receptacle: 125 V, 15/20 A, NEMA WD 1, heavy-duty, general use with metal cover plate; conforming to NEMA WD 6, Configuration 5-20. 125 V, 30 A, NEMA WD 1, heavy-duty, general use with metal cover plate; conforming to NEMA WD 6, Configuration 5-30. Furnish with weatherproof "while in use" covers for outdoors, wet or industrial locations.

PART 3 EXECUTION

3.1 SITE CONDITIONS

- A. Ensure site is ready to receive work before start of construction.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Conduit:

1. Cut conduit square using saw or pipecutter. Cut ends of conduit shall be reamed smooth.
2. Install no more than the equivalent of three 90-degree bends between junction boxes. Use hydraulic one-shot conduit bender or factory elbows for conduit diameter larger than 1-1/2 inch.
3. Use Form 8 conduit bodies to make sharp changes in direction. Avoid moisture traps, provide junction box with weep hole.
4. Provide cast metal boxes such as FS or FD in damp or wet locations.
5. Make final conduit connections to motors or other vibrating equipment with approximately 3-foot, liquid-tight flexible metal conduit.
6. Field route conduit and supports. They are not indicated explicitly on Drawings.

B. Wire and Cable:

1. Swab conduit before installing cable. Remove burrs, dirt, or other debris. For existing conduit, pull a mandrel through before pulling cable to verify roundness and bending radii.
2. When pulling cable into conduit, use wire pulling compound.
3. Make splices only in outlet or junction boxes.
4. Provide equipment grounding conductor along with phase conductors in conduits.
5. Include an integral ground conductor in multi-conductor cables.
6. Connect grounding conductors to equipment with compression lugs. Connect grounding connections to clean, dry surfaces. Remove scale, rust, grease, and dirt from surfaces to which grounding connections are to be made.
7. Color-code the conductors. Identify No. 6 AWG and larger conductors using colored tape at terminals and splice points. Identify No. 8 AWG and smaller conductors using colored insulation or jacket. Use the following color codes.

480Y/277V	Phase A	Yellow
	Phase B	Orange
	Phase C	Brown
	Neutral (grounded)	Gray
	Ground	Green
208Y/120V	Phase A	Black
	Phase B	Red
	Phase C	Blue
	Neutral (grounded)	White
	Ground	Green

C. Nameplates:

1. Clean surfaces before installing nameplates.
2. Install nameplates parallel to equipment lines. Secure nameplates to equipment fronts using self-tapping screws.

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D. Wire and Cable Marker:

1. Provide wire markers on each conductor in pull boxes and junction boxes and at each load connection. Provide cable tags in pull boxes for multiconductor cables.
2. Use wire and cable tags to identify panel and circuit number or control wire number, as required.

E. Disconnect Switches:

1. Do not fastened to or penetrate wall panels when mounting supports.

F. Receptacles:

1. Install convenience receptacles 48 inches above finished grade. Do not fastened to or penetrate wall panels when mounting receptacle supports.
2. Label receptacles with panelboard and circuit number from which they are served.

G. Combination Magnetic Motor Starters:

1. Motor controllers in cabinet shall be indicated on Drawings.
2. Install overload heater element in motor controller to match motor characteristics.
3. Provide engraved nameplate identifying motor served.

H. Selector Switches and Pushbuttons:

1. Install selector switches and pushbuttons in cabinets as indicated on Drawings.

I. Clearances:

1. Clearances from points of access to electrical equipment and other devices shall conform to the requirements of NFPA 70.
2. Equipment control devices and other electrical equipment requiring operation or maintenance shall have a minimum working clearance of 3 feet from the surface of operation or access, unless greater clearance is required by NFPA 70.

J. Boxes:

1. Coordination of Box Locations
 - a. Provide electrical boxes as indicated and as required for splices, taps, wire pulling, and equipment connections.
 - b. Electrical box locations indicated are approximate unless dimensioned.
 - c. Locate and install boxes to allow access.

2. Outlet Box Installation
 - a. Firmly secure in place outlet or utility boxes concealed in the construction. Set outlet or utility boxes true, square, and flush with the finish surfaces for the application of the appropriate cover plate.
 - b. Provide knockout closures for unused knockout openings.
 - c. Support boxes independently of conduit except for cast boxes when connected to two rigid metal conduits, both supported within 12 inches of the box to be supported.
 - d. Use multiple gang boxes where more than one device is mounted together. Do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
3. Pull and Junction Box Installation
 - a. Support pull and junction boxes independently of conduit.

K. Cabinets:

1. Install cabinet fronts and sides plumb.

L. Supporting Devices:

1. Complete installation of structural steel framing, concrete pads, etc., before installing supporting devices.
2. Fasten hanger rods, conduit clamps, and outlet and junction boxes to support structures in accordance with manufacturer's recommendations.
3. Use expansion anchors for support on concrete surfaces.
4. Do not fasten supports to piping, mechanical equipment, or conduit.
5. Fabricate supports from structural steel or steel channel. Rigidly bolt to structural steel to present a neat appearance. Use hexagon head bolts with spring lock washers under nuts.
6. Install freestanding electrical equipment on concrete pads. Concrete shall conform to ODOT Item 499, Class F, 3000 psi compressive strength at 28 days, and Item 511.
7. Install surface mounted cabinets and enclosures with four anchors (minimum). Provide steel channel supports to stand cabinets and enclosures 1 inch from the wall.

3.3 QUALITY CONTROL

A. Electrical Inspection and Testing – General:

1. Electrical inspection and testing for work in this Section and in other electrical Sections shall conform to the following requirements and to NETA ATS. Perform tests required by NETA ATS for electrical work on this Project unless specific instruction is provided otherwise. Note additional requirements or exceptions in the other electrical sections for the specific electrical work of that Section only.
2. Testing shall be witnessed by Construction Manager, CQC Consultant-Quality Control personnel (who must approve results) and manufacturer's service representative(s), if required. Notice of testing must be furnished 7 days in advance.

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3. Submit test results and calibration data on approved forms.
4. Perform operational tests to demonstrate control and interlocking wiring.
5. Visual inspections shall be performed for phasing and connections. Phasing shall be A, B, C clockwise at all three phase disconnects.
6. Repair or replacement of components where test results are unacceptable, including those damaged during testing process, is required.

B. Electrical Inspection and Testing:

1. Perform continuity and operation tests on power and control circuits. Low voltage thermographic survey of cable connections required by NETA ATS is not required. Wire insulation for conductors No. 6 AWG and larger shall be megger tested between each conductor and ground. A 1,000-volt megger shall be used for insulation rated 600 volts. Minimum resistance shall be 100 megohms.
2. Insulation resistance tests shall not be performed on solid state equipment unless authorized by its manufacturer and in strict accordance with the manufacturer's recommendations. Solid state equipment includes static ground fault devices, such as ground fault circuit interrupters.
3. Confirm that electrical connections to utilization equipment have been made in accordance with manufacturer's instructions.
4. Perform motor tests according to NETA ATS.
5. Motor windings shall be checked for continuity.
6. Motor windings rated 460 volts nominal shall be megger tested with a 1,000-volt megger before connection of power leads. Minimum acceptable resistance shall be 100 megohms. Motor and phase rotation shall be checked with a phase rotation tester manufactured by G. Biddle Company (Catalog No. 56060) or equal on equipment, which could be damaged by reverse rotation.
 - a. Motor and phase rotation shall be verified before energizing motors.
 - b. Motors shall be "bumped" to check for proper direction of rotation before performing operational tests on the equipment in the presence of the Construction Manager.

END OF SECTION

SECTION 16170
GROUNDING AND BONDING

PART 1 GENERAL

1.1 SCOPE

A. This Section includes, but is not limited to the following:

1. grounding electrodes and conductors.
2. equipment grounding conductors.
3. bonding.

1.2 RELATED DOCUMENTS

A. Part 6 - Statement of Work.

1.3 REFERENCES

A. InterNational Electrical Testing Association (NETA):

1. NETA ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, current edition.

B. National Fire Protection Association (NFPA):

1. NFPA 70, National Electrical Code, current edition.

C. Underwriters Laboratories, Inc. (UL):

1. UL 467, UL Standard for Safety Grounding and Bonding Equipment, current edition.
2. Electrical Construction Materials Directory, current edition.

1.4 SYSTEM DESCRIPTION

A. Rod electrode and grounding connections.

B. Grounding System Resistance: 5 ohms maximum.

1.5 SUBMITTALS

A. Provide submittals as required by Part 6. Unless specified otherwise, submittal shall be made to the Construction Manager for review and approval.

- B. Submit the following after Notice to Proceed:
 - 1. catalog sheets for all equipment and materials.
 - 2. certification of ground testing instrumentation.
 - 3. all procedures and record forms for required testing.

- C. Submit the following after completing of tests:
 - 1. all test reports.
 - 2. record of as-built locations of grounding electrodes.

1.6 QUALITY ASSURANCE PROGRAM

- A. Conform to requirements of NFPA 70.

- B. Furnish products listed in the UL Electrical Construction Materials Directory as suitable for the purpose specified and indicated.

- C. Provide certification of ground testing instrumentation according to NETA ATS.

1.7 ENVIRONMENTAL AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Mechanical Connectors:
 - 1. Burndy.
 - 2. Ideal.
 - 3. IlSCO.

- B. Exothermic Connections:
 - 1. Cadweld.
 - 2. Thermoweld.

2.2 MATERIALS

- A. Rod Electrode.

1. Copper-clad steel, 3/4-inch diameter, 10-foot length.
- B. Mechanical Connectors.
 1. Bronze.
- C. Wire.
 1. Grounding Conductor: Stranded copper sized to meet NFPA 70 requirements.
- D. Grounding and bonding materials shall conform to UL 467.

PART 3 EXECUTION

3.1 SITE CONDITIONS

- A. Verify that final backfill and compaction have been completed before driving rod electrodes.
- B. Verify that underground utilities will not interfere with the proposed rod locations prior to driving rod electrodes.

3.2 ERECTION/INSTALLATION/APPLICATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install additional rod electrodes as required to achieve specified resistance to ground.
- C. Equipment Grounding Conductor: Provide separate, insulated conductor with each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- D. Ground pole-mounted equipment and static line conductors.
- E. Drive ground rods until the top is 1 foot 0 inch below-grade.

3.3 QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation as defined by specifications and manufacturer's instructions. Test instrumentation shall conform to NETA ATS. Provide certification for instrumentation.
- B. Measure the system's resistance to the ground; perform testing in accordance with instrument manufacturer's recommendations. Measure resistance at each pole and at each 480 V service as a minimum. Provide written test reports indicating overall resistance to ground and resistance of each electrode to ground.

END OF SECTION

SECTION 16370
OVERHEAD POWER DISTRIBUTION

PART 1 GENERAL

1.1 SCOPE

- A. This Section contains requirements for temporary overhead power distribution which may be required in the course of the construction project. This Section includes, but is not limited to, the following:

1. Wooden poles
2. Pole hardware.
3. Line conductors.
4. Anchors.

1.2 RELATED SECTIONS

- A. Part 6 - Statement of Work.
- B. Part 8 - Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. National Fire Protection Association (NFPA):
1. NFPA 70, National Electrical Code, 1999 edition, current edition.
- B. American National Standards Institute (ANSI):
1. ANSI C2, National Electrical Safety Code, current edition.
 2. ANSI C135.1, Galvanized Steel Bolts and Nuts for Overhead Line Construction, current edition.
 3. ANSI O5.1, Wood Poles Specifications and Dimensions, current edition.
- C. American Wood-Preservers Association (AWPA):
1. AWPA C4, Poles - Pressure Process, current edition.
- D. National Electrical Manufacturers Association (NEMA):
1. NEMA WC 7, Cross-Linked Thermosetting Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy, current edition.
- E. Underwriters Laboratories, Inc. (UL):

1. Electrical Construction Materials Directory, current edition.

1.4 SUBMITTALS

- A. Provide submittals as required by Part 6. Unless specified otherwise, submittals shall be made to the Construction Manager for review and approval.
- B. Submit the following after Notice to Proceed:
 1. Catalog sheets for all equipment and materials.
 2. All procedures and record forms for required testing.
 3. Any MSDSs where applicable.
- C. Submit all test reports after completing of tests.

1.5 QUALITY ASSURANCE PROGRAM

- A. Conform to requirements of NFPA 70 and ANSI C2.
- B. Furnish products, where available, listed in the UL Electrical Construction Materials Directory, as suitable for the purpose specified and indicated.
- C. Temporary installations shall comply with ANSI C2, Rule 263, Grade N Construction. Where permanent modifications to existing installations are made to facilitate temporary installations, such modifications shall conform to ANSI C2, Heavy Loading District, Grade B Construction.

1.6 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Pole Hardware.
 1. Pole Hardware: Hot-dipped galvanized after fabrication and as indicated on the Drawings.
 2. Eye Bolts and Nuts: ANSI C135.1.
 3. Ground Rods: Copperweld 3/4 inch O.D. by 10 foot 0 inches long.
 5. Butt Plate: Copper.
 6. Guy Strand: High strength, seven-strand steel cable galvanized to ASTM A475, Class A or B.
 7. Guy Termination: Preformed wire type.
 8. Guy Guards: 8-foot (2 m) long plastic, colored yellow.
 9. Ground Wire: Soft drawn solid copper conductors, 4 AWG minimum size.
 10. Air Terminal: UL 96; 18-inch copper air terminal.

11. Guy Adapter: Tripleye.

B. Line Conductors.

1. Secondary Conductors: aluminum, three insulated conductors and messenger/ground wire with 600 volt cross-linked polyethylene insulation for phase conductors conforming to NEMA WC 7.

C. Anchors.

1. Helical Screw Anchors: Galvanized steel, ASTM A36/36M.

PART 3 EXECUTION

3.1 SITE CONDITIONS

- A. Verify no underground utilities are located below the poles before installation.
- B. Use small diameter steel probe to verify area is free of underground obstructions before installation of anchors.

3.2 ERECTION/INSTALLATION/APPLICATION

- A. Install products in accordance with manufacturer's instructions.
- B. Plug unused holes in poles using treated wood dowel pins. Treat field-cut gains and field-bored holes with preservative.
- C. Shorten poles when required by cutting from top end. Apply hot preservative to shortened end of pole.
- D. Set poles in straight line. Place curved poles with curvature in line with lead pole. Maintain an even grade.
- E. Dig setting holes large enough to permit use of tampers to full depth. Place earth in maximum 6-inch layers and tamp.
- F. Rake poles located at corners, angles, and dead ends so that poles are vertical after line installation.
- G. Do not install poles along the edge of cuts and embankments or where soil may be washed out.

H. Minimum depths in normal firm ground, measured from lower side of pole:

OVERALL LENGTH	DEPTH FOR STRAIGHT LINES	DEPTH AT CURVES, CORNERS, AND POINTS OF EXTRA STRAIN
30'	5'-6"	5'-6"
35'	6'-0"	6'-0"
40'	6'-6"	6'-6"
45'	7'-0"	7'-6"
50'	7'-6"	8'-0"
55'	7'-6"	8'-0"

- I. Install 480 V conductors maintaining clearances as follows: above roads, - 23 feet; over buildings, all conductors, 8 feet. Maintain 40 inches spacing between communication lines and power lines.
- J. Make aluminum connections to copper or other material using only splices, connectors, lugs, or fittings designed for that specific purpose.
- K. Install guys and anchors according to ANSI C2 requirements.
- L. Bond metal enclosures on poles to pole ground wire in accordance with NFPA 70, ANSI C2 and manufacturer's instructions.

END OF SECTION

SECTION 16462
DRY TYPE TRANSFORMERS/PANELBOARDS

PART 1 GENERAL

1.1 SCOPE

- A. This Section includes, but is not limited to, dry type, two-winding transformers integrated with primary and secondary main breakers and feeder breakers.

1.2 RELATED SECTIONS AND DOCUMENTS

- A. Section 16050 - Basic Electrical Materials and Methods.
- B. Part 6 - Statement of Work.
- C. Part 8 – Environmental Health and Safety, and Training Requirements.

1.3 REFERENCES

- A. InterNational Electrical Testing Association (NETA):
1. NETA ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, current edition.
- B. National Electrical Manufacturers Association (NEMA):
1. NEMA AB 1, Molded Case Circuit Breakers and Molded Case Switches, current edition.
 2. NEMA PB 1, Panelboards, current edition.
 3. NEMA PB 1.1, General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less, current edition.
 4. NEMA ST 20, Dry Type Transformers for General Applications, current edition.
 5. NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum), current edition.
- C. National Fire Protection Association (NFPA):
1. NFPA 70, National Electrical Code, current edition.
- D. Underwriters Laboratories, Inc. (UL):
1. Electrical Construction Materials Directory, current edition.

1.4 SUBMITTALS

- A. Provide submittals as required by Part 6. Unless otherwise specified, submittals shall be made to the Construction Manager for review and approval.
- B. Submit the following after Notice to Proceed:
 - 1. Catalog sheets and shop drawings for all equipment and materials.
 - 2. Product data to include outline and support point dimensions of enclosures and accessories; unit weight; voltage; kVA, number of phases, impedance ratings, and characteristics; X/R ratio; tap configurations; insulation system type; rated temperature rise; and main bus ampacity, integrated short circuit ampere rating, circuit breaker, arrangement, and sizes.
 - 3. Factory test reports: NEMA ST 20. Indicate loss data; efficiency at 25, 50, 75, and 100 percent rated loads; and sound level.
 - 4. All procedures and record forms for required testing.
- C. Submit the following after completing of tests:
 - 1. All field test reports: Indicate primary and secondary voltages as measured, according to NETA ATS.

1.5 QUALITY ASSURANCE PROGRAM

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed in the UL Electrical Construction Materials Directory for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver transformers/panelboards individually wrapped for protection and mounted on shipping skids.
- B. Accept transformers/panelboards on site. Inspect for damage.
- C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer/panelboards' internal components, enclosure, and finish.

1.7 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health and safety, and training requirements shall be as required in Part 8.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Siemens.
- B. Westinghouse.
- C. Square D.

2.2 EQUIPMENT

A. Two-winding transformers.

1. Description: NEMA ST 20, factory-assembled, air-cooled, dry type transformers; ratings as indicated on Drawings.
2. Insulation system and average winding temperature rise for rated kVA as follows:
 - a. 1-30 kVA: Class 185 with 115 ° C rise.
3. Case Temperature: Do not exceed 40 ° C rise above ambient at warmest point.
4. Winding Taps:
 - a. Transformers: NEMA ST 20. Transformers shall have four full current taps, two at 2-1/2 percent each above and two at 2-1/2 percent each below normal voltage.
5. Sound Levels: NEMA ST 20, not to exceed 85 dBA at 3 feet.
6. Basic Impulse Level: 10 kV.
7. Ground core and coil assembly to enclosure by means of a visible, flexible copper grounding trap.
8. Mounting: Suitable for wall mounting, except where indicated otherwise on Drawings.
9. Coil Conductors: Continuous windings with terminations brazed or welded.
10. Enclosure: NEMA ST 20. Provide lifting eyes or brackets.
11. Isolate core and coil from enclosure, using vibration-absorbing mounts.
12. Nameplate: Include connection data and overload capacity based on rated allowable temperature rise.

B. Branch Circuit Panelboards.

1. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.
2. Enclosure: NEMA PB 1; Type 3R conforming to NEMA 250.
3. Cabinet Size: As shown on manufacturer's drawings.
4. Cabinet Front: Hinged cover with paddle lock hinge.
5. Provide an integrated unit with transformer. Finish in manufacturer's standard gray enamel.
6. Provide panelboards with copper bus, ratings as scheduled on drawings. Provide copper ground bus in each panelboard.
7. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical.

8. Molded Case Circuit Breakers: NEMA AB 1; plug-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, rated for 75 degrees C copper conductors. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A and Class B ground fault interrupter (GFCI) circuit breakers where required. Provide 20 percent spare breakers installed in the panelboard, including at least one 30 mA GFCI breaker, unless otherwise indicated on Drawings.

PART 3 EXECUTION

3.1 ERECTION/INSTALLATION/APPLICATION

- A. Install transformer/panelboards in accordance with NEMA PB 1.1.
- B. Install plumb, in accordance with manufacturer's instructions and as indicated on Drawings.
- C. Height (transformer/ panelboard combination only): 6 feet, 6 inches to top of transformer section.
- D. Provide grounding connections in accordance with Section 16170.
- E. Provide filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- G. Provide engraved plastic nameplates identifying transformer/panelboard equipment number.
- H. After initial energizing of transformers, measure the secondary voltage and adjust to nominal voltage by changing taps.

3.2 QUALITY CONTROL

- A. Test according to general requirements of Section 16050 and to the relevant requirements of NETA ATS.
- B. Visual and mechanical inspection: Inspect for physical damage, proper alignment, anchorage, grounding, and conformance of installation to contract documents and manufacturer's instructions. Check tightness of wiring and mounting connections for circuit breakers and transformer prior to energizing.
- C. Record primary and secondary voltages; submit to the Construction Manager.
- D. Measure steady state load currents at each panelboard feeder. Rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION