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Environmental Restoration Program

FIRE FIGHTING TRAINING AREA REMOVAL ACTION OPERABLE UNIT 5 WORK PLAN

MOUND PLANT
MIAMISBURG, OHIO

Volume III – Appendices F and G

June 1994

Final
(Revision 0)

U.S. Department of Energy
Albuquerque Operations Office

EG&G Mound Applied Technologies

REFERENCE USE ONLY

APPENDIX F

CONTRACT DRAWINGS AND SPECIFICATIONS - CONSTRUCTION

(Drawings Bound Separately)

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SECTION 01010

SUMMARY OF WORK

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Description of the Project.
2. Work to be Performed.
3. Special Provisions.

B. Related Sections

1. Section 02100: Site Preparation
2. Section 02120: Site Survey and Survey Control
3. Section 02130: Soil Sampling
4. Section 02200: Earthwork
5. Section 02222: Excavation and Staging
6. Section 02223: Backfill and Rough Grading/Restoration
7. Section 02225: Trenching

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 DESCRIPTION OF THE PROJECT

A. The work at the EG&G Mound Fire Fighting Training Area (FFTA) near Building 34 at the EG&G Mound site in Miamisburg, Ohio entails construction of treatment pads including utility service and staging area; removal of sediments, excavation of soil, and decommission of underground fuel supply and drain lines containing petroleum hydrocarbons; and backfilling, grading, and restoration of excavated areas with backfill soil material as specified.

B. The Work may require the containerization and transport to the Mound Waste Water Treatment System (WWTS) of decontamination rinsewater and other contact water resulting from construction activities and stormwater runon/runoff.

C. The Contractor will perform all Work onsite so as not to interfere with normal EG&G Mound operations. The Contractor will coordinate all site activities with the Engineer before commencement of Work. The Contractor may bring onsite for the Contractor's and Engineer's use an office trailer within the site boundaries. A separate area within the trailer is to be used by the Engineer and is to have access to the fax machine and photocopier, if so equipped.

3.02 WORK TO BE PERFORMED

A. Mobilization, site preparation, and removal action activities to be performed by the Contractor will include:

1. Construction

- Site control survey established from EG&G Mound established monuments.
- Two (2) composite, multi-media (soil, geomembrane), contaminated soil bioremediation treatment pads. Approximate dimensions: (1) 85' x 46', (2) 42' x 65'.
- Leachate collection piping.
- Runoff collection piping.
- Two (2) precast concrete manholes, each with an impermeable interior coating or lining.
- Installation of sump pump with controls.
- One (1) single slope roof structure. Components for the pre-engineered structure will be supplied.
- An aboveground spray irrigation system for the treatment pads.
- Twenty-five pre-engineered building footers (design to be provided).
- Temporary soil staging cell, geomembrane lined dimensions (40' x 46').
- Decontamination area. (Concrete pad is provided.)
- Electric (30 amp 3 circuits) and water (1.5 inch) service to treatment pad roof structure.
- Electric service (30 amp 2 circuits) to south exterior wall of the Building 34 addition.
- Electric service (40 amp 1 circuit) to precase concrete manholes.
- Installation of guardrail.
- Installation of high visibility fencing around construction area.

- Access roads (2) to treatment pads.
- Erosion and sediment control measures (silt fence, hay bales, riprap, temporary and permanent seeding).
- Earthwork operations.

2. Removal

- 310 cubic yards of petroleum-contaminated soil excavated and transported to temporary soil staging area.
- Training pits sediment.
- Training pits fuel supply and drain lines decontamination and removal.
- Scarification and removal of concrete training pits.
- Aboveground storage tank, concrete pad, and transite drain pipe.
- Torch stand.
- Relocation of steel plates, above ground tank, and other miscellaneous items.
- Backfill.
- Transport of contaminated water to Mound WWTS. It is expected that water will be transported every 2000 gallons collected and to a distance of 1/4 mile from the site. In the unlikely event of radiation contamination, the tanker truck will be surrendered to Mound and the Contractor will receive adequate compensation for a comparable replacement vehicle.

B. The above list is a general description of The Scope of Work. The Contractor is responsible for all Work in the Drawings and Specifications whether or not they are listed above.

C. The Contractor shall utilize pre-approved backfill soil material from offsite source(s) for use in site restoration and excavation backfill. This material will be sampled for physical properties and approved by the Engineer and follow EG&G Mound requirements for backfill. This approval must be obtained during site preparation activities. The Engineer is responsible for the physical testing of all offsite material as required in these Specifications.

D. The Contractor shall remove the sediments within Training Pits #1 and #2 and excavate the soils shown on Drawing G1, Site and Erosion and Sediment Control Plan, to the depths specified. The Contractor shall provide any shoring, cutback, water diversion, temporary fence or guardrail removal, or groundwater infiltration control necessary to perform the excavation while ensuring roadway stability and worker safety. All

excavated soils will be removed from the area of excavation and transported to the onsite staging area. The Contractor is responsible for containerizing all contact water generated. The Contractor is responsible for transportation of all contact water not meeting WWTS treatment criteria to a RCRA-licensed disposal facility. The RCRA-licensed disposal facility must be pre-approved by the Engineer prior to any "out-of-criteria" water disposal. The Contractor is responsible for scheduling all transportation. The Contractor is responsible for payment of any incurred fees to the transportation and disposal facilities. Costs for transportation and disposal of "out-of-criteria" water will be included in a Change Order.

E. The Engineer will perform soil sampling of the excavated area and contact water (with the Contractor's assistance, as required), verify that the specified soil cleanup criteria have been achieved, and determine parameters of contact water prior to treatment at the Mound WWTS. The Engineer will perform all chemical analyses of samples using an offsite fixed-base laboratory. The Contractor shall not be permitted to perform analysis of soil, water, or air from the site other than those required by these Specifications. The Contractor must closely coordinate the excavation and site activities with the requirements for sampling and testing that will be performed by the Engineer to ensure a smooth progression of work and to meet the project schedule.

F. The Contractor shall containerize for transport to the Mound WWTS all decontamination and contact water.

G. The Contractor shall remove designated soil, properly backfill, and restore the excavation area as specified in Section 02222 and Section 02223 of these Specifications.

H. The Contractor shall be responsible for collecting and providing temporary storage of all water from excavations as a result of precipitation, site runon and/or groundwater infiltration. Analyses of collected liquids may be performed by the Engineer. The Contractor shall transport the containerized water to the Mound WWTS for treatment every 2000 gallons at an approximate distance of 1/4 mile.

I. The Contractor shall prepare and maintain project records and documentation as required in these Specifications.

J. The Contractor is responsible for placement of backfill, rough grading, and seeding of the site upon completion of removal of soil and installation of erosion and sedimentation control structures.

K. The Contractor is responsible for replacement of roadways and any other structures removed or damaged during construction.

L. The Engineer at any time without notice to any Surety may make changes in the work to the Contract by making alterations therein, by making additions thereto, or by omitting work therefrom, and no such action shall invalidate the Contract, relieve or release the Contractor from any guarantee under the Contract, affect the terms or validity of any bond, relieve or release any Surety, or constitute grounds for claim by the Contractor for damages or loss of anticipated profits. All work required by such alterations, additions, or omissions shall be executed under the terms of the Contract.

Other than in an emergency endangering life or property or pursuant to a Field Revision, the Contractor shall not make any changes in the Work nor furnish any labor, equipment materials, supplies, or other services in connection with any change except pursuant to, and after receipt of, a written authorization from the Engineer in the form of a Change Order, Change of Contract Price or extension of the Contract Time, and no claim therefore shall be valid, unless such written authorization has been so issued to the Contractor.

The Engineer may authorize minor changes in the work which do not alter the character, quantity, or cost of the work as a whole. These changes may be accomplished by a Field Revision. The Contractor shall carry out such Field Revision promptly and without any adjustment of the Contract Price or Contract Time.

M. The Engineer will make monthly progress payments to the Contractor for the monthly percentage of work completed less any retainage. Such payment shall be made only after the Contractor's submission of an approved application for payment.

3.03 SPECIAL PROVISIONS

A. Commencement, Prosecution, and Completion of Work. The Contractor shall commence work under this Contract within five (5) working days following the Engineer's acceptance of the Contractor's submittals, prosecute said work diligently, and complete the entire work in accordance with the approved project schedule. The time stated for completion shall include final cleanup of the premises and demobilization.

The Contractor shall perform all work during normal working hours (6:30 a.m. - 5:30 p.m.), Monday through Thursday unless previously agreed to by the Engineer. Any proposed deviations to the schedule such as earlier starting times, longer working hours, and/or work on Saturdays or Sundays, shall be clearly noted by the Contractor and submitted with his schedule.

1. Exception to Completion. If the Engineer determines that the final portions of site restoration such as seeding and/or the specified maintenance thereof, are infeasible during the construction period due to weather limitations, such work will be excepted from the completion schedule and shall be accomplished during and after the first seeding period following the completion date.

2. Inclement Weather. Based on weather conditions or other outside limitations the Engineer may direct the Contractor to temporarily suspend operations, and secure the site. Work will be restarted at a future date when construction activities can be initiated at the direction of the Engineer. The Contractor is responsible for proper shutdown and demobilization of all his equipment and operations during this period as well as any temporary erosion and sedimentation control required to stabilize the site. It is expected that during periods of lightning or high winds, work on the roof structure and treatment pad construction may be suspended.

B. Drawings and Specifications

1. Contractor shall check all Drawings furnished immediately following their receipt and shall promptly notify the Engineer of any discrepancies. Dimensions

marked on Drawings shall be followed in lieu of scale measurements. Enlarged plans and details shall govern where the same work is shown at smaller scales. The Contractor shall compare all Drawings and verify the dimensions before performing the Work and will be responsible for any errors that might have been avoided thereby.

2. All work performed and all materials furnished shall be in conformity with the lines, grades, cross-sections, dimensions, and material requirements, including tolerances, shown on the Drawings and indicated in these Specifications.

3. In the event the Engineer finds the material, or the finished product in which the materials are used, not in conformity with the Drawings and Specifications, but that reasonably acceptable work has been produced, he shall then make a determination if the work shall be accepted and remain in place. In this event, the Engineer shall document the basis of acceptance by Contract Modification, which will provide for an appropriate adjustment in the Contract Price for such work or materials as he deems necessary to conform to his determination based on engineering judgement.

4. In the event the Engineer finds that the materials, the finished product in which the materials are used, or the work performed, are not within reasonably close conformity with the Drawings and Specifications, and have resulted in an inferior and/or unsatisfactory product, the work or materials shall be removed and replaced, or otherwise corrected, by and at the expense of the Contractor.

C. Submittals

1. General Description

a. This section includes general requirements and procedures related to the Contractor's responsibilities for preparing and transmitting submittals to the Engineer to demonstrate that the performance of the work will be in accordance with the Contract requirements. Submittals include construction schedules, material lists, shop drawings, product data, and samples. Other requirements for submittals are specified under applicable sections of these Specifications.

2. Submittal Requirements

a. Within five (5) working days after the date of the Notice to Proceed, the Contractor shall submit in writing his updated construction schedule.

b. No later than five (5) working days after the date of the Notice to Proceed, the Contractor shall submit in writing a list of materials that will be purchased, giving name, address, and telephone number of supplier. No material shall be incorporated into the work until approval of the source has been given. Delivery of materials to the Contract site, prior to approval, is made at the Contractor's risk. Said material is subject to immediate removal at no cost to the Engineer when it is determined that the source is unacceptable.

c. Submittals shall be scheduled and coordinated with the Engineer's and the Contractor's construction schedule.

d. The Engineer will respond in accordance with Approval of Submittal below.

D. Construction Schedule

1. Within five (5) working days after the date of the Notice to Proceed, the Contractor shall prepare and submit for review and approval, to the Engineer, an "updated" schedule showing the order in which the Contractor proposes to perform the Work and the dates upon which he proposes to start and complete each work item. The updated schedule shall be a revision of the Bid Schedule with completion dates for major work elements remaining unchanged. The schedule shall show each work item with usage of the entire Contract Time provided in the Contract, and shall include the dates for submittals, analysis, approval of materials and Contractor's drawings, and the procurement of materials, plant, and equipment. The Contractor shall incorporate within his schedule the sampling, and analysis activities to be performed by the Engineer. The construction schedule shall be in bar chart form, showing contemplated completion percentages and arranged to record actual completion percentages at stated intervals.

2. The Engineer may require the Contractor to furnish additional information and data to justify the basis of the schedule and reflect additional level of detail. The Contractor shall provide this information and schedule revisions until the schedule is approved.

3. The approved construction schedule shall be kept current as work progresses, including work added by change order, and shall be submitted to the Engineer once every two (2) weeks at the weekly progress meetings. The approved progress schedule may be changed only with the written permission of the Engineer. If the Contractor fails to submit the required updated schedule within the time prescribed, the Engineer may withhold approval of progress payment estimates until such time as the Contractor submits the required current updated schedule.

4. The construction schedule shall, in general, determine the order in which the Work is to proceed. However, the Engineer may order and authorize minor changes to this schedule whenever such changes are of definite advantage to or necessary for the operations of the Mound facility.

5. If the Contractor fails to adhere to the approved progress schedule or the schedule as revised, he shall promptly adopt other or additional means and methods of construction to make up for the time lost to ensure completion in accordance with the schedule at no additional cost to the Engineer. The initial scheduled termination date will be maintained and additional manpower and equipment will be employed by the Contractor to substantially maintain the initial completion date.

E. Contractor's Drawings

1. General. Contractor's drawings of the onsite liquids containerization units, shoring, pad, and any other details required shall be neat in appearance, legible, and explicit to enable proper review to ensure Contract compliance. They shall be complete and detailed to show fabrication; assembly and installation details, wiring and control diagrams, catalog data, pamphlets, descriptive literature, and performance and test data. They shall be accompanied by calculations or other sufficient information to provide a comprehensive description of the structure, machine, or system provided and its intended manner of use. If the Contractor's drawings deviate from the Contract Documents, the Contractor shall advise the Engineer in writing with the submittal and state the reason therefore. No portion of the Work requiring a Contractor's drawing shall be started nor shall any materials be fabricated, delivered to the site, or installed, prior to the approval by the Engineer of such item. Fabrication performed, materials purchased, or onsite construction accomplished that do not conform to approved Contractor's drawings shall be at the Contractor's risk. The Engineer will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity. The review and approval of Contractor's drawings by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor; therefore, the Engineer will have no responsibility. Contract work, materials, fabrication, and installation shall conform with approved Contractor's drawings.

F. Shop Drawings. Shop drawings shall show types; sizes; accessories; layouts, including plans, elevations, and sectional views; components; assembly and installation details; and all other information required to illustrate how applicable portions of the Contract requirements will be fabricated and/or installed. In the case of fixed mechanical and electrical equipment, layout drawings drawn to scale shall be submitted to show required clearances for operation, maintenance, and replacement of parts. This will include manufacturer's certified performance curves, catalog cuts, pamphlets, descriptive literature, installation, and application recommendations, as required. Shop drawings for closely related items such as a pump and its motor shall be submitted together.

G. Catalog Data. Manufacturer's catalog, product, and equipment data shall be certified and shall include materials type, performance characteristics, and similar data. Wiring diagrams will be provided when applicable. Catalog, model, and serial numbers representing specified equipment shall be indicated. Complete component information to verify all specified required items shall be provided.

H. Manufacturers' Installation Recommendations. Manufacturers' installation recommendations and instructions shall provide written, detailed, step-by-step preparation and installation of the materials and products, including recommended quality control testing.

I. Submittal Process.

1. General. Each Contractor's drawing submitted by the Contractor shall have affixed to it the following certification statement signed by the Contractor:

"Certification Statement:

By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers, and pertinent data, and I have checked and coordinated each item with other applicable approved drawings and all Contract requirements."

2. Identification. With the first submittal, the Contractor shall submit a schedule listing as near as practical by Specification section number, all submittals required and approximate date the submittal will be forwarded. All submittals for approval shall have the following identification data, as applicable, contained thereon or permanently adhered thereto:

   - Engineer name.
   - Project name and location.
   - Project identification.
   - Submittal title, submittal number, revision number, and date of submittal and revision.
   - Applicable Drawing numbers and Specification section and paragraph numbers.
   - Subcontractor, vendor, and/or manufacturer name, address, and telephone number.
   - Contractor certification statement.

   For catalog product data or brochures submitted in packages of multiple items, the identification is needed only on the exterior. In such instances, the identification shall include page and catalog item numbers for items submitted for approval. If one or more of the items in such a submittal are not approved, resubmittal of only the unapproved items is required. Catalog, product data, or brochures containing various products, sizes, and materials shall be highlighted to show the particular item being submitted. Likewise, items not applicable to the contract shall be marked "not applicable" or crossed out.

3. Space. A vacant space of approximately 5 inch high by 5 inch wide shall be provided adjacent to the identification data to receive the Engineer's status stamp.

J. Approval of Submittal. Each submittal shall be in accordance with the Contractor's submission schedule. The Contractor shall allow five (5) working days for checking and appropriate action by the Engineer.

Contractor's submittals will be returned stamped with one of the following classifications:

- NO EXCEPTIONS TAKEN - No corrections, no marks.

- MAKE CORRECTIONS NOTED - A few minor corrections. All items may be fabricated as marked without further resubmission. Resubmit a corrected copy to the Engineer.

- REVISE AND RESUBMIT - Minor corrections. Items not noted to be revised and corrected may be fabricated. Resubmit Drawings as per original submission with corrections noted. Allow five (5) working days for checking and appropriate action by the Engineer.

- REJECTED - Requires corrections or is otherwise not in accordance with the Contract Documents. No items shall be fabricated. Resubmit as per the initial submittal. Indicate changes made. Allow five (5) working days for checking and appropriate action by the Engineer.

- INFORMATION ONLY - Items not reviewed or items for which submittals are not required.

K. Physical Testing of Construction Materials

1. General. The Contractor is required to conduct physical testing (grain size distribution, etc.) of construction materials as required in the Specifications to certify that they meet the requirements of the Specifications. The costs of sample testing shall be borne by the Contractor and shall be included in the backfill material cost. These certified test results will be submitted by the Contractor to the Engineer for approval of the material. The Engineer may conduct separate testing of material samples to confirm test results.

2. Backfill Material. The location and name of the offsite sources of clean backfill have been provided in these Specifications. The Contractor shall arrange for access to the backfill sources for the Engineer and the Contractor to collect samples of the backfill material. The Contractor is responsible for transporting the samples for physical testing to the Contractor's approved geotechnical laboratory. The Engineer will conduct any chemical analyses necessary. The Contractor is responsible only for physical testing. This testing may be used by the Engineer to approve the backfill source and may include the placement of soil borings at the source location to obtain samples. The Engineer may request access to the borrow source prior to Contract award or after the date of the Notice to Proceed.

3. Material Suppliers. Within five (5) working days after the date of the Notice to Proceed, the Contractor shall submit names of the material suppliers and resubmit the names and locations of borrow sources. Approval by the Engineer shall be obtained prior to delivery of the material to the Contract site.

4. Identification. Each sample shall have the following identification data permanently attached:

   - Engineer.
   - Project name and location.
   - Applicable Contract Drawing and Specification section number.

- Subcontractor, vendor, and/or manufacturer name, address, and phone number.

The Contractor shall mail under separate cover a letter submitting each shipment of samples containing the identification information listed herein. The Contractor shall enclose a copy of this letter with the shipment.

5. Approval of Data. The Contractor shall allow five (5) working days for checking physical testing data and appropriate action by the Engineer. Certain samples may be tested for specified requirements by the Engineer before approval is given. Failure of a sample to pass such tests will be sufficient cause for refusal to consider further samples of the same brand and make of that material. When an originally submitted sample fails, retesting of additional samples will be performed by the Engineer at the expense of the Contractor.

   Samples of various material (aggregate, erosion control materials, etc.) or equipment delivered to the site or during placement may be taken by the Engineer for testing. Samples failing to meet Contract requirements will automatically void previous approvals, and resubmittal and retesting of the material will be required.

L. Record Drawings

1. The Contractor shall keep one record copy of all Contract Documents at the site in good order and annotated to show all measurements made during any surveying performed by the Engineer. Such annotations shall be kept current and may be inspected by the Engineer at any time. Record Drawings shall be available to the Engineer at all times during the life of the Contract.

2. All Drawings shall be made a part of the Record Drawings and shall include the following:

   - Contract Drawings. Annotate or redraft, as required, to show all revisions, substitutions, variations, omissions, and discrepancies made or discovered during construction concerning location and depth of utilities, piping, conduits, manholes, pumps, valves, vaults, and other equipment. Revisions shall be made and shown on all Drawing views with actual dimensions established to permanent points.

   - Installation Drawings. Same as Contract Drawings when installation Drawings are required. For example, include actual layouts of conduit runs between various items of electrical equipment for power, control, and instrumentation; wire sizes, numbers, and functions; configuration of conduits; piping layouts; and drainage net layout. Sections and details shall be added, as required, for clarity. Drawings, motors, control centers and other equipment shall be revised to show actual installations.

3. At the completion of the Contract, or at the Engineer's request and before final payment is made, the Contractor shall furnish to the Engineer one (1) set of

mylar reproducibles of the record Drawings reflecting all revisions herein described.

4. Approval Requests. From time to time, as the Work progresses and in the sequence indicated by the approved progress schedule, the Contractor must submit to the Engineer a specific request, in writing, for each item of information or approval required by him. These requests must be submitted sufficiently in advance of the date upon which the information or approval is actually required by the Contractor to allow for the time the Engineer may take to act upon such submissions or resubmissions. The Contractor shall not have any right to an extension of time due to delays caused by failure to submit his requests for the required information or the required approval in accordance with these requirements.

M. Extension of Time

1. The Contractor shall be entitled to an extension of time only for the number of days of delay that the Engineer determines to be justified and only to the extent that such occurrences actually delay the completion of the project. It is hereby understood that the determination by the Engineer as to the order and sequence of the Work shall not in itself constitute a basis for extension of time.

2. The determination made by the Engineer on the application for an extension of time shall be binding and conclusive on the Contractor.

3. Delays caused by failure of the Contractor to meet his proposed productivity; failure of dealers to furnish approved working drawings, materials, fixtures, equipment, appliances in accordance with the approved schedule; or failure of Subcontractors to perform their work in conformity with the approved schedule; shall not constitute a basis for extension of time.

N. Changes

1. Minor Changes

a. The Engineer reserves the right to make such additions, deductions, or changes to this Contract from time to time as it deems necessary and in a manner not materially affecting the substance thereof or materially changing the price to be paid in order to carry out and complete more fully and perfectly the Work herein agreed to be done and performed. This Contract shall in no way be invalidated by any such additions, deductions, or changes, and no claim by the Contractor shall be made for any loss of anticipated profits thereby.

b. Construction conditions may require that minor changes be made in the location and installation of the work and equipment to be furnished and other work to be performed hereunder, and the Contractor, when directed by the Engineer, shall make such adjustments and changes as do not alter the character, quality, or cost of the work as a whole, and provided further that Drawings and Specifications showing such adjustments and changes are furnished by the Contractor to the

Engineer within a reasonable time before any work involving such adjustment and changes is begun. The Engineer shall be the sole judge of what constitutes a minor change for which no additional compensation shall be allowed.

O. Layout of Work

1. The Contractor will provide a State of Ohio licensed professional surveyor to perform all onsite surveying work in support of the construction activities. The Contractor shall advise the Engineer, in advance, regarding schedule and requirements for surveying and the Engineer will make arrangements for the work. The Contractor shall request the surveying services in advance to adequately schedule the work. The Contractor's surveyor shall perform the work from the information indicated on the Drawings and shall make all measurements in connection therewith. The Surveyor shall furnish all stakes, templates, platforms, equipment, tools, materials, and labor as required in performing any part of the work. The Contractor shall execute the work to the lines and grades established or indicated and shall maintain and preserve all stakes and other control points already established until authorized to remove them. If such controls are destroyed by or through negligence of the Contractor, prior to their authorized removal, they may be replaced by the Engineer at his discretion, and the expense of replacement will be deducted from any amounts due or that become due to the Contractor.

2. All work under this Contract shall be constructed in accordance with the lines and grades shown or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

3. Benchmarks exist on the Mound site and their coordinates and elevation will be provided. The Surveyor is responsible for setting any other reference points needed to complete the work.

P. Quantity Surveys. The Engineer will make such surveys and computations as are necessary to determine the quantities of work performed or placed during each period for which a progress payment is to be made. The Contractor may provide intermediate surveying of excavations and final grading to determine progress of work at no cost to the Engineer.

Q. Identification of Employees. The Contractor shall require each employee engaged in the work to display identification as specified in Section 02080: Site Security.

R. Contractor Quality Control

1. The Contractor shall provide and maintain an effective Quality Control Program.

2. Except for tests or other items of work specified to be performed by the Engineer, the quality of all work shall be the responsibility of the Contractor. Sufficient inspections of all items of work, including that of Subcontractors, to ensure conformance with the Contract Documents with respect to the quality of materials, workmanship, construction, finish, functional performance, and identification shall be performed on a continuing basis. The Contractor shall

furnish qualified personnel, appropriate facilities, instruments and devices necessary for the performance of the quality control function. The controls shall be adequate to cover all construction operations and shall be keyed to the proposed construction sequence.

3. Preparatory inspections shall be performed prior to beginning each feature of work on any construction work. Preparatory inspections for the applicable feature of work shall include: reviewing of submittal requirements and all other Contract requirements with the foreman or supervisors directly responsible for the performance of the work; checking to ensure that provisions have been made to provide required field testing; examining the work area to ascertain that all preliminary work has been completed; verifying all field dimensions and advising the Engineer of any discrepancies; and performing a physical examination of materials and equipment to assure that they conform to specifications or submittal data and that all materials and/or equipment are available.

   a. Initial inspection shall be performed as soon as work begins on a representative portion of the particular feature of work and shall include examination of the quality of workmanship, as well as a review of controls for compliance with Contract requirements.

   b. Follow-up inspections shall be performed continuously as any particular feature of work progresses to ensure compliance with Contract requirements, including compliance controls, until completion of that feature of the work.

   c. Safety inspections of the work in progress shall be performed daily to ensure compliance with occupational health and safety requirements of the Contract and the Engineer's Health and Safety Plan. Daily quality control reports shall be used to document the inspection and shall include a notation of the safety deficiencies observed and the corrective actions taken. The Contractor shall use the designated quality control staff with additional personnel as required. Additional personnel shall be provided at no additional cost to the Engineer.

S. Non-Disclosure. All information written or otherwise, obtained as a result of this Contract shall not be disclosed to any persons or parties without the written consent of the Engineer.

T. Working Limits. The available working limits for the work for this Contract are the Building 34 area limits and the Mound property lines. The Contractor shall not trespass on anyone's private property without first obtaining permission from the Engineer.

U. Length of Contract. Time is of the essence. All work specified shall be completed by 14 October 1994.

V. Contractor Coordination with Others. The Contractor shall be aware that if any other Contractor(s) is onsite during construction activities, he shall coordinate with such Contractor(s) and Engineer in such a manner that he shall not impede Mound plant operation or personnel.

W. Public Relations. The Contractor shall make every effort to minimize any inconvenience or nuisance to the neighboring property owners. These efforts shall include the minimization of noise, dust, odors, and traffic obstructions. The Contractor shall agree to conform to the work hours specified in the Contract unless otherwise agreed to by the Engineer.

X. Alcohol and Drugs

1. EG&G Mound does not allow any alcohol on Mound property, nor does EG&G Mound allow any person under the influence of alcohol to work on behalf of EG&G Mound. Any person suspected of, or found to be under the influence of alcohol will be removed from the property.

2. EG&G does not condone the use of illegal drugs. Any person in possession of any illegal drug or found to use any illegal drug will be removed from this project.

3.04 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 GENERAL

1.01 GENERAL

A. Comply with the general requirements in this Section when preparing, processing and submitting shop drawings, product data and samples.

B. Also comply with the supplemental requirements relating to shop drawings, product data and samples as specified in the technical specification sections.

C. Shop drawings and product data are not Contract Documents.

1.02 RELATED REQUIREMENTS

A. Section 01010: Summary of Work

1.03 CONTRACTOR RESPONSIBILITIES

A. Confirm and correlate fabrication processes, techniques of construction and coordination of work between trades.

B. Shop Drawings, Product Data and Samples

1. Review prior to submission.

2. Coordination between trades.

a. Assemble shop drawings of interdependent trades, cross check, coordinate and obtain required corrections. Transmit to Engineer as a single submittal.

b. Alternately, make composite drawings showing interrelationship of the concerned trades. Subsequent shop drawings must confirm to the reviewed composite drawing.

c. Fragmentary or piecemeal transmittals for individual trades will be returned unchecked and will not be considered as submission.

C. Determine and verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with specifications.

D. Coordinate each submittal with requirements of the Work and of the Contract Documents.

E. Notify the Engineer in writing at time of submission of any deviations in the submittals from requirements of the Contract Documents.

F. Contractor's responsibility for deviations from requirements of Contract Documents is not relieved by Engineer's review of submittals. The Contractor may submit specific deviations to the Engineer for review, but such deviations will require the Engineer's written acceptance.

G. Begin no fabrication or work which requires submittals until return of submittals with Engineer's approval.

1.04 ENGINEER'S DUTIES

A. The Engineer's duties relative to shop drawings product data and samples are as follows:

1. Review for general conformance with design concepts and Contract documents.
2. Affix stamp and initials or signature indicating the review of submittal.
3. Return submittals to Contractor for distribution.

B. Disposition will be one of the following: No Exception Taken, Make Corrections Noted, Rejected, Revise and Resubmit, or Information only.

C. Review of a separate item does not constitute review of an assembly in which the item functions.

D. The Engineer will attempt to review submittals within ten (10) days from receipt of submission. The Contractor will be notified if additional time is required.

1.05 SUBMITTAL REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. Prepare and submit, within 15 days following Award of Contract, a separate schedule listing dates for submission of each shop drawing or submittal required.

C. Schedule submissions at least 15 days before reviewed submittals will be needed.

D. Number of submittals required

1. Shop Drawings. Submit three (3) copies plus copies required for Contractor.
2. Product Data. Submit three (3) copies plus copies required for Contractor.
3. Samples. Submit the number stated in each specification section.

E. Include in the submittal

1. The date of submission and the dates of any previous submissions.
2. The project title and number.
3. Contract identification.
4. The names, addresses, and phone numbers of:

   a. Contractor
   b. Subcontractor
   c. Supplier
   d. Manufacturer.

5. Identification of the specification section number governing the submittal.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the Work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
9. Identification of deviations from Contract Documents.
10. Identification of revisions on resubmittals.
11. A 5 in. x 5 in. blank space for engineer's stamp.
12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

F. Accompany submittals with a transmittal letter, in duplicate.

1.06 RESUBMITTAL REQUIREMENTS

A. Make any corrections or changes in the submittals required by and at no cost to the Engineer and resubmit until approved.

B. Shop Drawings and Product Data

1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
2. Indicate any changes which have been made including those requested by the Engineer.

C. Samples. Submit new samples as required for initial submittal.

D. Accompany resubmittals with a transmittal letter in duplicate. In the transmittal letter, show the number assigned to the original submittal.

1.07 PREPARATION REQUIREMENTS

A. Shop Drawings

1. Preparation by a qualified detailer is required.
2. Identify details by reference to sheet and detail numbers shown on Contract Drawings and/or section number of the Specifications.
3. Sheet size to 24" x 36" or 8 1/2" x 11".

4. Reproductions for submittals to be opaque diazo prints or blueprints.
5. All shop drawings and submittal data are to be in the English language. Use standard English system of measurements for all dimensions, weights, flows, forces and capacities.

B. Product Data

1. Preparation

a. Clearly mark each copy to identify pertinent products or models.
b. Show performance characteristics and capacities.
c. Show dimensions and clearances required.
d. Show wiring or piping diagrams and controls.

2. Manufacturer's standard schematic drawings and diagrams:

a. Modify drawings and diagrams to delete information which is not applicable to the Work.
b. Supplement standard information to provide information specifically applicable to the Work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES, UTILITIES, AND CONTROLS

SECTION 01500

TEMPORARY FACILITIES, UTILITIES, AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Temporary Controls

a. Barriers.
b. Guard Rails.
c. Fencing.
d. Protection of the Work.
e. Dust Control.
f. Water/Liquids Control and Handling.
g. Erosion and Sedimentation Control.

2. Construction Facilities

a. Access Roads.
b. Parking.
c. Progress Cleaning.
d. Temporary Buildings.

B. Related Sections

1. Section 01700: Demobilization and Project Closeout
2. Section 02080: Site Security
3. Section 02100: Site Preparation
4. Section 02223: Backfill and Rough Grading/Restoration

PART 2 PRODUCTS

2.01 MATERIALS

A. Silt fence shall be "Envirofence", a preassembled silt fence by Mirafi, Inc., or approved equivalent.

B. Straw or hay bales shall have a minimum of two bale bindings securely in place.

C. Stakes for straw or hay dikes shall be #5 rebar, 2-inch diameter wood, or equal, with sufficient length to be driven to an approximate minimum of 18 inches into the ground, except where site conditions prohibit, and be flush with the top of the bale.

D. Backfill material stripped from the following sources shall not be considered suitable for use as topsoil or fill material:

- Soils having a pH less than 5.5 or greater than 8.0
- Chemically or radiologically contaminated soils.
- Areas from which the original surface has been stripped and/or covered over such as borrow pits, open mines, demolition sites, dumps, and sanitary landfills.

E. Water. EG&G Mound shall provide clean water, free from salt, oil, and other deleterious material from a source onsite. Water will be the primary means for dust control.

PART 3 EXECUTION

3.01 TEMPORARY CONTROLS

A. Barriers. The Contractor shall provide barriers (high-visibility fencing) to restrict access to construction areas and to protect existing adjacent facilities from damage from construction operations and demolition. The Contractor shall provide luminescent reflective barricades around the perimeter of all excavation. Unless authorized by the Engineer, fencing shall not restrict EG&G Mound personnel's use of Building 34 and surrounding facilities. Barriers shall also be used to protect vehicular traffic, stored materials, site and structures from damage.

B. Guard Rails. The Contractor shall install guard rails as indicated on the Drawings.

C. Fencing. The Contractor shall provide high-visibility fencing around all areas of excavation operations to restrict access.

D. Protection of the Work. The Contractor shall protect installed Work and provide special protection where specified in individual Specification Sections, provide temporary and removable protection for installed products, and control activity in immediate work area to minimize damage. The Contractor shall provide protective coverings for all work being done in existing facilities.

E. Dust Control. The Contractor shall be solely responsible to minimize dust created by any and all operations to such a degree that it will not create a public nuisance or endanger the safety and welfare of EG&G Mound employees and operations. The Contractor shall implement strict dust control measures during active construction periods onsite. These control measures will generally consist of water applications that shall be applied at a minimum of once per day during dry weather or more often as required by the Engineer to prevent dust emissions. The Contractor shall apply water to dirt surfaces and excavations to keep areas damp without ponding.

The Contractor shall prevent the traveling of mud, dirt, or sediment onto Plant or public roadways. Specification include:

1. Washing. Wheels of vehicles that have been decontaminated or only entered non-exclusion areas, shall be cleaned to remove sediment prior to entrance onto the plant road. When washing is required, it shall be done on the decontaminant's pad. All sediment shall be prevented from entering any storm drain, ditch, or watercourse through use of sand bags, gravel, boards, or other

approved methods. Any vehicles (except haul trucks) entering exclusion zones must be decontaminated first at the decontamination pad where rinsate will be collected and tested.

2. Maintenance. The entrance shall be maintained in a condition that will prevent tracking or flowing of sediment onto the site entrance road or public right-of-way. All sediment spilled, dropped, washed, or tracked onto the site access road or EG&G Plant Roads must be removed immediately by the Contractor at no cost to the Engineer.

F. Water/Liquids Control and Handling. The Contractor shall maintain excavations free of water and provide, operate, and maintain pumping equipment to protect site from puddling or running water.

G. Erosion and Sedimentation Control

1. The Contractor shall furnish all labor, equipment, and materials needed to complete the work for erosion and sedimentation controls as shown on the Drawings and specified herein. All erosion and sedimentation control work shall comply with applicable requirements of governing authorities having jurisdiction. The Contractor shall provide the necessary straw bales, silt fence, temporary and permanent seeding in accordance with Montgomery County Soil Conservation Service recommendations, and/or other temporary erosion control measures required and contain all his work activities, and as directed by the Engineer.

2. The Contractor is responsible for assuring that these controls are properly constructed, installed, maintained, and functioning. The Contractor shall provide maintenance and make all necessary repairs to ensure that the controls are operating properly at no additional cost to the Engineer. Erosion control measures shall be established at the beginning of construction and maintained by the Contractor during the entire period of construction. Onsite areas that are subject to damage from erosion and/or sedimentation are to be identified and will receive special attention.

3. All land-disturbing and earth moving activities are to be planned and conducted so as to minimize the size of the area to be exposed at any one time and to minimize the duration of exposure.

4. Surface water runoff originating upgrade of exposed areas shall be controlled to minimize surface water entering excavated areas and work areas. Temporary diversions shall be provided by the Contractor upgradient of all excavations. The Contractor is responsible for the collection of any surface water entering the excavation. This water shall be handled as per these Specifications.

5. Sediments collected in any temporary erosion and sediment control structures downgradient of the excavated area shall transported to the soil staging area or as directed by the Engineer.

6. Should conditions arise in the field that render the Drawings or these Specifications inappropriate or inadequate, the Contractor shall immediately

notify the Engineer. Additional Drawings or modifications, when required, will be furnished by the Engineer and will become part of the Contract Documents.

7. The Contractor shall be responsible for the proper installation and maintenance of all erosion and sedimentation controls throughout the Work until the Work is completed and the site is adequately stabilized to the satisfaction of the Engineer. At that time, the Engineer shall grant approval for the removal of temporary erosion controls.

8. The Contractor shall inspect all erosion and sedimentation controls after each storm event and on a regular weekly basis. A checklist shall be kept by the Engineer defining those controls requiring cleanout, repair, or replacement. The Contractor shall then rectify the noted deficiencies within two (2) working days of the date of written notification.

9. The Contractor shall maintain all controls as specified and remove accumulated sediment as directed by the Engineer and to provide proper functioning of these controls. The Contractor shall restore the site and remove temporary drainage, erosion, and sedimentation controls after completion of the Work and stabilization of the site with the approval of the Engineer.

3.03 CONSTRUCTION FACILITIES

A. Access Roads. The Engineer will designate existing onsite roads that may be used for construction traffic.

B. Parking. When site space is not adequate, offsite contractor parking is available.

C. Progress Cleaning. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

D. All staged or stockpiled soils containing petroleum hydrocarbons shall be covered by an impervious material (i.e. canvas tarp or synthetic liner or equal) and kept covered until they are removed from the staging area. These tarps must be in good condition with no tears and shall be tied down with sufficient stakes or weighted to prevent them from blowing away. Erosion, runon, and runoff control shall also be implemented in these areas in accordance with this section.

3.04 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

SECTION 01570

TRAFFIC REGULATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Signs, Signals, and Devices.
2. Construction Parking Control.
3. Flagmen.
4. Haul Routes.
5. Removal.

B. Related Sections

1. Section 01010: Summary of Work
2. Section 01500: Temporary Facilities, Utilities, and Controls

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 SIGNS, SIGNALS, AND DEVICES

A. The Contractors use of traffic cones, drums, and lights will be approved by EG&G Mound and the Engineer.

3.02 CONSTRUCTION PARKING CONTROL

A. The Contractor shall control vehicular parking to prevent interference with Mound traffic and parking and access by emergency vehicles, monitor parking of construction personnel's vehicles, maintain vehicular access to and through parking areas, and prevent parking on or adjacent to access roads or in non-designated areas. A designated Contractor parking lot is maintained outside the Mound Plant Contractor's Gate for use when additional parking space is needed.

3.03 FLAGMEN

A. The Contractor shall provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on Mound traffic lanes.

3.04 HAUL ROUTES

A. The Engineer will indicate haul routes designated by Mound for use of construction traffic. The Contractor shall confine construction traffic to designated haul routes,

provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with Mound traffic, and relocate as Work progresses, to maintain effective traffic control.

3.05 REMOVAL

A. The Contractor shall remove equipment and devices when no longer required, and repair damage caused by installation.

3.06 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 01700

DEMOBILIZATION AND PROJECT CLOSEOUT

SECTION 01700

DEMOBILIZATION AND PROJECT CLOSEOUT

PART 1 GENERAL

A. Section Includes

All work required for the final cleanup, utility termination, and removal of Contractor's equipment from the site as to remove all evidence of construction activities, and all work associated with the final inspection of the site.

1. Restoration and Restabilization.
2. Removal of Unsuitable Material.
3. Demobilization.
4. Final Cleanup.
5. Final Inspection.

B. Related Sections

1. Section 02110: Site Cleaning
2. Section 02223: Backfill and Rough Grading/Restoration

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 DEMOBILIZATION

A. The Contractor's equipment and vehicles shall be inspected by Mound Health Physics and by the Engineer prior to removal from the site.

B. The Contractor shall disconnect and remove all temporary utilities and structures.

C. The Contractor shall remove all storage and office facility provided under this Contract.

D. All disturbed areas shall be restored to their pre-construction state or better.

E. The Contractor shall inspect the site with the Engineer to assure that all work has been completed to his satisfaction before the retainage is paid to the Contractor.

3.02 RESTORATION AND RESTABILIZATION

A. Restoration and restabilization will be performed as specified in Section 02223: Backfill and Rough Grading/Restoration.

3.03 REMOVAL OF UNSUITABLE MATERIAL

A. Material delivered to the Site, which has been determined by the Engineer to be unsuitable or not in accordance with the Contract Documents, shall be removed from the work site and disposed of in a approved manner at no cost to the Engineer.

3.04 FINAL CLEANUP

A. Prior to the final inspection, a final construction cleanup shall be undertaken and shall consist of the removal of all mud, oil, grease, soil, gravel, trash, scrap, debris, and excess materials that are unsightly or may cause hazards to personnel. These materials shall be disposed of in accordance with state and local regulations and as approved by the Engineer.

3.05 FINAL INSPECTION

A. Upon receiving the Contractor's written request for final inspection and scheduling same, the Engineer will inspect the site area with the Contractor and Mound personnel. The inspection will identify and document (via a punch list) the additional items required to declare the site area to "substantial completion". If, in the opinion of the Engineer the site area can be declared substantially complete, the Engineer will issue a letter so stating to the Contractor. If, in the opinion of the Engineer, the site area cannot be declared substantially complete, no such letter will be issued and another inspection will be scheduled. All punchlist items identified by the inspection shall be repaired, replaced, or completed as required to the satisfaction of the Engineer. Final payment and release of the retainage will not be made until all of the punchlist items are resolved to the satisfaction of the Engineer.

3.06 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 02060

DEMOLITION

SECTION 02060

DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

Demolition of concrete FFTA pits and removal of materials from site. Removal of underground fuel supply and drain line piping. Building 34 upgrade of electrical system.

1. Qualifications.
2. Regulatory Requirements.
3. Preparation.
4. Demolition Requirements.
5. Sequence and Schedule.
6. Demolition of Concrete Slabs.
7. Decommission of Underground Lines.
8. Building 34 Electrical Upgrade.

B. Related Sections

1. Section 01500: Temporary Facilities, Utilities, and Controls
2. Section 01700: Demobilization and Project Closeout
3. Section 02222: Excavation and Staging
4. Section 02223: Backfill and Rough Grading/Restoration
5. Section 16060: Electrical Demolition

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 REGULATORY REQUIREMENTS

A. The Contractor shall conform to applicable codes for demolition of structures, safety of adjacent structures, dust control, and disposal. The Contractor shall notify the Engineer before starting work.

3.02 PREPARATION

A. The Contractor shall provide, erect, and maintain temporary barriers and security devices and protect existing appurtenances and structures which are not to be demolished, removed, or upgraded. The Contractor shall prevent movement or settlement of adjacent structures.

3.03 DEMOLITION REQUIREMENTS

A. The Contractor shall conduct demolition, electrical installations, and decommissioning activities to minimize interference with adjacent structures. The Contractor shall cease operations immediately if adjacent structures appear to be in danger and notify the Engineer. The Contractor shall not resume operations until directed by the Engineer. The Contractor shall conduct operations with minimum interference to EG&G Mound operations and employees and maintain egress and access at all times.

3.04 SEQUENCE AND SCHEDULE

A. The Contractor shall perform work in stages to accommodate EG&G Mound's occupancy and use requirements during the demolition, decommission, and upgrade periods.

3.05 DEMOLITION OF CONCRETE SLABS

A. After scarification operations and cleanup of scarified material and sediment have occurred, the two existing concrete FFTA pits will be demolished. The Contractor shall break the concrete slabs into manageable size pieces suitable for offsite disposal at a municipal landfill. Prior to offsite disposal, Mound Health Physics personnel will wipe sample the debris to verify that elevated radiological contamination does not exist on the surface of the concrete debris. Once the concrete debris has been removed from the FFTA location, excavation of potentially contaminated soil will occur as per Section 02222: Excavation and Staging.

3.06 DECOMMISSION OF UNDERGROUND LINES

A. Underground fuel supply and drain lines associated with past FFTA pit operations will be decontaminated and removed as part of the removal activity. The Contractor shall decontaminate the underground lines with a method approved by the Engineer. After decontamination, the Contractor shall excavate and remove the drain lines as specified in Section 02222: Excavation and Staging and as shown on the Drawings. Mound Health Physics personnel will screen and wipe sample the removed piping to verify that elevated radiation is not present on the surface of the piping prior to offsite disposal in a municipal landfill. Sampling of the base of the excavation will be performed by the Engineer to determine the extent, if any, of contamination resulting from use of the underground lines. Excavation and sampling of the soil will be as specified in Section 02222: Excavation and Staging, and Section 02130: Soil Sampling. Backfill of the excavation will be in accordance with Section 02223: Backfill and Rough Grading/Restoration.

3.07 BUILDING 34 ELECTRICAL UPGRADE

A. Minor demolition at Building 34 may occur as a result of electrical upgrades and extension detailed in Section 16060: Electrical Demolition.

3.08 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 02080

SITE SECURITY

SECTION 02080

SITE SECURITY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Entrance Control.
2. Site Security Protocols.
3. Entrance Gate.
4. Site Security.
5. Security Emergencies.

B. Related Section

1. Section 01010: Summary of Work

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 ENTRANCE CONTROL

A. The Mound Plant is in operation 24 hrs per day. The site security is controlled during normal operating hours by EG&G Mound security personnel. The Contractor's personnel must abide by and follow Mound Plant security procedures at all times when onsite. Before any Contractor personnel are permitted to conduct work onsite, an initial Mound Plant safety and orientation training session must be attended. It is a 1/2 hour presentation sponsored by EG&G Mound. Scheduling of attendance at the EG&G Mound orientation training shall be coordinated with the Engineer.

3.02 SITE SECURITY PROTOCOLS

A. The Contractor's security protocols must conform to the EG&G Mound. All personnel onsite must display a Mound issue identification badge and radiation dosimeter which is issued by security upon entering the Mound Plant and submitted to security upon departing the Plant.

3.03 ENTRANCE GATE

A. The Contractor shall only be allowed to the site through the Contractor's entrance gate on the south side of the Plant from Benner Road.

3.04 SITE SECURITY

A. The Contractor is responsible for the security of all project personnel, equipment, vehicles, field offices, sheds, employee facilities, and laboratory facilities during the active construction period.

The Contractor shall provide the proper control over all of his vehicles entering, leaving, and on the site. The Contractor's vehicles shall park only in the area designated by the Engineer and EG&G Mound. These vehicles shall maintain a vehicle inspection checklist that is to be kept current on a weekly basis. All vehicles entering the Mound Plant shall display a Mound vehicle registration obtained from the Engineer. All construction equipment is subject to an inspection by Mound Construction Safety Department upon entering the site.

3.05 SECURITY EMERGENCIES

A. The Contractor shall coordinate with the Engineer and Mound operational personnel and with local law enforcement officials (i.e., police/sheriff, highway patrol, emergency medical corps units, fire department, and utility emergency teams) to map out contingency plans for any emergency situation. The Fire Fighting Training Area Site Health and Safety Plan details specific procedures for emergency situations.

3.06 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02100

SITE PREPARATION

SECTION 02100

SITE PREPARATION

PART 1 GENERAL

A. This section describes site preparation work required to be accomplished prior to the start of the actual cleanup work. Precise sequence of the site preparation activities is the responsibility of the Contractor with approval by the Engineer.

1.01 SUMMARY

A. Section Includes

1. Protection of Survey Controls/Roads/Equipment.
2. Utilities.
3. Staging Area.
4. Dust Control.
5. Health and Safety.
6. Clearing and Grubbing.
7. Erosion and Runoff Control.
8. Soil Excavation/Staging.
9. Liquids Handling.
10. Temporary Access Roads.
11. Site Security.
12. Decontamination Area(s).

B. Related Sections

1. Section 01500: Temporary Facilities, Utilities, and Controls
2. Section 02080: Site Security
3. Section 02222: Excavation and Staging
4. Section 02200: Earthwork

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PROTECTION OF SURVEY CONTROLS/ROADS/EQUIPMENT

A. The Contractor shall protect and maintain survey and grid stakes, fences, and roads against damage from equipment and vehicular traffic. Any damage shall be repaired by the Contractor at no cost to the Engineer.

3.02 UTILITIES

A. The Contractor shall protect utility lines or appurtenances that are to remain. Any damage shall be repaired by the Contractor at no cost to the Engineer.

The Engineer does not guarantee the accuracy of the locations for existing subsurface piping, utilities, and structures shown on the Drawings, nor does the Engineer guarantee that all subsurface structures are shown. The Contractor shall verify the location and elevation of all underground utilities and structures before the start of work.

The Mound Construction Safety Inspector shall clear all areas prior to excavation. The Contractor shall notify the Engineer prior to any intrusive activities such that arrangements with the Mound Construction Safety Inspector can be made.

3.03 STAGING AREAS

A. An onsite staging and stockpiling area necessary for site work activities shall be constructed by the Contractor per these Specifications and as shown on the Drawings. This area shall be constructed during site preparation activities.

3.04 DUST CONTROL

A. The Contractor shall adhere to the protocols for the control of dust as specified in Section 01500: Temporary Utilities and Controls, during all site preparation activities.

3.05 HEALTH AND SAFETY

A. The Contractor shall comply with the WESTON FFTA Health and Safety Plan as amended and Mound Plant construction and safety protocols.

3.06 CLEARING AND GRUBBING

A. The area designated for remediation shall be cleared and grubbed, if required, prior to the initiation of soils excavation.

3.07 EROSION AND RUNOFF CONTROL

A. The Contractor shall construct temporary construction erosion and runoff control at the site as required for the designated site area, and as specified in Section 01500: Temporary Facilities, Utilities, and Controls.

3.08 SOIL EXCAVATION/STAGING

A. The Contractor shall prepare for soil removal activities at the site as required for the designated site area, and as specified in Section 02222: Excavation and Staging, including soil handling and stockpile areas.

3.09 LIQUIDS HANDLING

A. The Contractor shall set up permanent facilities and procedures for collecting liquids as specified and as shown on the Drawings.

3.10 SITE SECURITY

A. The Contractor shall provide the necessary site security measures at the site to protect his equipment, materials, and supplies. The Engineer is not responsible for any damage to the Contractor's equipment, vehicles, supplies, etc. due to unauthorized entry.

3.11 DECONTAMINATION AREA

A. The Contractor shall perform decontamination in the areas specified in the Drawings for personnel and construction equipment decontamination. The requirements for construction equipment decontamination are provided in Section 02110: Site Cleaning.

The Contractor shall provide a method of decontamination of construction equipment and any other procedures/methods required in the Specifications for approval prior to commencement of related construction activities.

3.12 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02110

SITE CLEANING

SECTION 02110

SITE CLEANING

PART 1 GENERAL

1.01 SUMMARY

The Contractor shall comply with the following requirements:

- Conduct cleaning and disposal operations to comply with federal, state, and local codes, ordinances, regulations, and pollution control laws.
- Use only those cleaning materials and methods that shall not create hazards to health or property.

A. Section Includes

Procedures for daily, maintenance, and final cleaning of the site and construction equipment.

B. Related Sections

1. Section 01700: Demobilization and Project Closeout
2. Section 02100: Site Preparation

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 The Contractor shall execute daily cleaning of the site to collect any accumulation of waste materials, discarded safety/protective equipment, debris, refuse, and rubbish. Collected material shall be placed in proper containers (provided by Mound) at approved staging/storage areas for disposal. Personal Protective Equipment (PPE) shall be segregated by the Contractor and screened by Mound Health Physics personnel prior to disposal.

3.02 The Contractor shall remove any collected sediment from erosion control facilities. The Contractor is responsible for the handling and loading for disposal of these sediments as directed by the Engineer.

3.03 Construction waste and excess construction materials generated by the Contractor shall be removed from the site and disposed of by the Contractor, in accordance with federal, state, and local regulations.

3.04 The Contractor shall remove all TPH-free refuse generated as part of the work under the Contract and dispose of these materials at an approved offsite disposal facility.

3.05 As part of the decommissioning of fuel supply and drain lines, the Contractor shall decontaminate the drain lines with a method approved by the Engineer.

3.06 At the completion of the Work, the Contractor shall decontaminate all construction equipment (i.e., vehicles, excavators, hand tools, etc.) used in exclusion zones (defined in the WESTON FFTA Health and Safety Plan) prior to demobilization from the site. Decontamination shall occur in areas defined on the Drawings or in areas approved by the Engineer and shall include a wash with Alconox followed by a high-pressure rinse. Screening and wipe sampling will be performed on the surfaces of excavator tires and bucket by Mound Health Physics personnel to verify the absence of elevated radiological contamination.

3.07 Prior to final completion of the Work, the Contractor shall conduct an inspection of all Work areas with the Engineer to verify that the entire site is clear of all waste materials, debris, refuse, and rubbish generated as a result of the site activities included in the contract. A certification of final cleaning shall be provided to the Engineer.

3.08 Excavation and miscellaneous equipment working inside an exclusion zone that comes in contact with soil shall be decontaminated prior to moving outside of the exclusion zone and into another work area. If only the bucket of the excavation equipment comes in contact with soils containing petroleum hydrocarbons or enters the exclusion zone, the bucket may be cleaned of gross contamination, wrapped in plastic, and the excavation equipment moved to another work area. In addition, heavy mill plastic or other impenetrable barrier material may be placed under the trucks/wheels of equipment entering the exclusion zone to allow the equipment to work "clean". Equipment kept clean may not have to be decontaminated before moving out of the exclusion zone. The Contractor and the Engineer must inspect the equipment to determine if it remained clean and if they agree that the equipment remained clean, it may be moved without decontamination. If determined that the equipment is not clean, it must be decontaminated prior to removal from the exclusion zone.

3.09 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02120

SITE SURVEY AND SURVEY CONTROL

SECTION 02120

SITE SURVEY AND SURVEY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. General.
2. Pit Excavation.
3. Treatment Pad Earthwork.
4. Backfill and Final Grading.

B. Related Sections

1. Section 02100: Site Preparation
2. Section 02110: Site Cleaning
3. Section 02130: Soil Sampling
4. Section 02222: Excavation and Staging
5. Section 02223: Backfill and Rough Grading/Restoration

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor will perform all surveying as necessary for the performance of the Work. The Contractor will be responsible for laying out the soil excavation area, treatment pad locations and elevations, and the treatment pad roof structure to be constructed; providing a survey of the existing surface elevations (topographical survey of each area), performing any intermediate surveying as needed; performing final survey of excavated depths and dimensions; and providing a final grade survey of backfilled areas. The Engineer will establish sample locations and the depth confirmations in relation to regulatory requirements. Final volume surveys for payment to the Contractor, will be performed by the Contractor. The Contractor may provide intermediate surveying as needed to assess the progress of his Work, but at no cost to the Engineer.

B. The Contractor shall coordinate all survey work with the Engineer prior to and during Work activities at the site. The Contractor will be held responsible for delays as a result of the Contractor not coordinating his schedule with the Engineer.

C. The Engineer shall request the Contractor to establish any temporary benchmarks as required for performance of the Work.

D. The survey markers shall be re-established by the Contractor's Surveyor as necessary until all areas have been excavated. If a survey marker is disturbed or temporarily

removed by the Contractor during excavation without authorization from the Engineer, it will be re-established by the Contractor and the costs borne by the Contractor. The Contractor is responsible for protecting survey markers in work areas.

3.02 PIT EXCAVATION

A. The Contractor shall notify the Engineer when the excavation is approaching the limits of excavation shown on the Drawings. The Contractor's Surveyor will then survey the excavation and the Engineer will determine if the removal design depth has been reached. Additional excavation in the pits will be maintained by intermediate surveys until the Engineer notifies the Contractor that the excavation is complete. The Contractor will then survey the excavation to determine final excavation dimensions prior to backfilling. Excavation beyond removal design limits shall be determined by the results of the field screening and verification sampling on the bottom and side walls of the excavation. Verification will be known within 24 hours of sampling.

3.03 TREATMENT PAD EARTHWORK

A. The Contractor shall notify the Engineer when the excavation of each area has reached the initial excavation limits, or less as instructed by the Engineer . The Contractor's Surveyor will then survey the area to verify the depths excavated and filled. Additional excavation will be maintained by intermediate surveys until the Engineer notifies the Contractor that excavation is complete. The Contractor will then survey the areas for final excavated dimensions and depths prior to treatment pad construction.

3.04 BACKFILL AND FINAL GRADING

A. The Contractor shall notify the Engineer prior to backfilling activities in each area and establish any backfill requirements necessary for the performance of the Work.

B. The Contractor shall notify the Engineer when rough grading is near completion. The Contractor shall work with the Engineer in establishing final grades at the excavation and trenching areas. The Contractor will perform, if necessary, intermediate surveying of grading operations to assess the Contractor's progress. The Contractor will provide final grade surveys of backfilled/disturbed areas.

3.05 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02130

SOIL SAMPLING

SECTION 02130

SOIL SAMPLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Soil Sampling

B. Related Sections

1. Section 02120: Site Survey and Survey Control
2. Section 02222: Excavation and Staging
3. Section 02225: Trenching

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 CHEMICAL SOIL SAMPLING

A. The Contractor is prohibited from performing any chemical analyses of soil or water from the site. Verification sampling will be performed by the Engineer. The Contractor is responsible for providing all the manpower, equipment, and materials to excavate to cleanup levels in the areas (surface and subsurface soil and fuel supply and drain lines) identified on the Drawings and as specified in Section 02222: Excavation and Staging. The Contractor shall coordinate his excavation activities with the Engineer to accommodate the required verification sampling and analysis.

B. Soil samples will be collected by the Engineer from excavated areas to verify that the cleanup criteria has been achieved or to determine if further excavation is necessary. The Contractor shall excavate to the estimated limits of FFTA Pit #2 as shown on the Drawings, after which the Engineer will perform verification screening and sampling. Additional screening and sampling by the Engineer will be performed along the base of the trenches created by the removal of the fuel supply and drain lines.

C. The Contractor shall closely coordinate his excavation activities with sampling and analysis activities through the Engineer to provide the most efficient excavation and sampling schedule.

The Engineer shall not be held responsible for delays in the excavation schedule as a result of the Contractor not coordinating his activities with the Engineer with regard to the sampling and analysis activities required at each excavation area.

D. Initial, intermediate, and final surveying to delineate pit and trench areas and to define the extent of excavation will be performed by the Contractor as specified in Section 2120: Site Survey and Survey Control.

E. After the Contractor has excavated the initial depth of soil from the pit and removed piping associated with the fuel supply and drain lines as directed by the Engineer, the Engineer may choose to perform screening activities, continue excavation, or to conduct verification sampling to determine if the applicable cleanup criteria have been achieved.

F. The Contractor shall maintain close contact with the Engineer to determine where excavation will proceed if the Engineer chooses to continue excavation prior to verification sampling.

G. Verification sampling at the pit excavation will be conducted by the Engineer unless excavation in this area extends to subsurface depths that require remote sampling.

H. When verification results have been received, the Engineer will direct the Contractor to stop excavation or to continue excavation in the specified areas. Verification sampling will be repeated in areas where excavation continues.

3.02 PHYSICAL SOIL SAMPLING

A. The Contractor will perform all physical soil sampling as required by the Specifications. This physical soil sampling includes three separate undisturbed soil samples from both the primary and secondary liners of each of the two treatment pads. These samples are to be analyzed for hydraulic conductivity using a Flexible Wall Permeameter by test method SW846 Method 9100 or equivalent. Results of these tests shall confirm a hydraulic conductivity of 1×10^{-8} cm/s or less.

B. The Contractor shall submit information on his proposed laboratory in accordance with Section 01340: Shop Drawings, Product Data and Samples.

C. Sufficient time must be given for approval of shop drawing submittal for laboratory to begin work.

3.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02200

EARTHWORK

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Staging Area.
2. Treatment Pads.

B. Related Sections

1. Section 01700: Demobilization and Project Closeout
2. Section 02080: Site Security
3. Section 02100: Site Preparation
4. Section 02223: Backfill and Rough Grading/Restoration

PART 2 PRODUCTS

2.01 MATERIALS

A. Collection System Drainage Sand

1. Shall consist of sand, stone sand, stone screenings or slag sand free from clay balls and adherent films of clay or other matter.

2. Grading requirements:

Sieve Size	Percent Passing
3/8	100
No. 4	95-100
No. 16	50-80
No. 30	30-60
No. 50	15-35
No. 100	0-20

B. Clay Backfill

1. Unified Soil Classification: CL, CH, or CL-ML. A minimum of 55% passing No. 200 sieve, a liquid limit of 30 or greater, a clay size fraction (0.005 mm) of 25%

or greater and a hydraulic conductivity of 1×10^{-6} cm/s or less. The clay must be compacted to 100% standard Proctor density at 2-4 percent above its optimum moisture content.

C. Riprap maximum laboratory dry density.

1. Riprap shall be reasonably well-graded from the smallest to the largest size specified and will be controlled by visual inspection. The size of stone will be controlled by visual inspection. Surge stone shall be 3-inch to 7-inch stone.

2. **Riprap Gradation**

Graded Rock Size (in.)		
Maximum	D_{50}	Minimum
6	3	2
12	6	3
18	9	5
24	12	7
30	15	12

D. Coarse Aggregate

1. Stabilized Construction Entrance as directed by the Engineer. AASHTO No. 1 generally meeting the following gradation requirements:

Sieve Size	Percent Passing
4 inch	100
3½ inch	90 - 100
2½ inch	25 - 60
1½ inch	0 - 15
¾ inch	0 - 5

2. Filter Berm and Pipe Bedding. AASHTO No. 67 generally meeting the following gradation requirements:

Sieve Size	Percent Passing
1 inch	100
¾ inch	90 - 100
⅜ inch	20 - 55
No. 4	0 - 10
No. 8	0 - 5

3. Site Access Roads, Desilting Structures, Gravel Outlets. AASHTO No. 3 generally meeting the following gradation requirements:

Sieve Size	Percent Passing
2½ inch	100
2 inch	90 - 100
1½ inch	35 - 70
1 inch	0 - 15
½ inch	0 - 5

4. Equipment Area Backfill as directed by the Engineer. Generally meeting the following gradation requirements:

Sieve Size	Percent Passing
1½ inch	100
1 inch	90 - 100
½ inch	25 - 60
No. 4	0 - 10
No. 8	0 - 5

PART 3 EXECUTION

3.01 STAGING AREA

A. A temporary soil staging area will be constructed at the location shown on the Drawings. An area approximately 40 feet by 60 feet will be cleared of debris. Soil within the 40 x 60 foot area will be reshaped to create a berm around the perimeter. The berm and staging area will be covered with 20 mil HDPE liner secured with anchor trenches along the outside perimeter of the berm.

3.02 TREATMENT PADS

A. The Contractor shall excavate as required to accommodate roof column footings. The Contractor shall grade the top perimeter of excavation to prevent surface water from draining into excavation, and remove lumped subsoil, boulders, and rock up to 1 cu yd measured by volume. The Engineer shall be immediately notified of unexpected subsurface conditions. The Contractor shall discontinue affected Work in area until notified by the Engineer to resume work. Relics, antiques, or items of historical significance remain the property of EG&G Mound. The Contractor shall obtain direction from the Engineer or EG&G Mound regarding method of removal of historically-significant items. The Contractor shall correct unauthorized excavation at no extra cost to Engineer.

B. The permanent treatment pads are to be constructed as indicated on the Drawings using a two liner clay construction, separated by a permeable leachate collection layer. The primary liner is to be constructed of 12 inches compacted clay. It shall be compacted to 100 percent of standard proctor (ASTM D 698), maximum laboratory dry density. The compaction shall be facilitated by a sheepsfoot vibratory roller or approved equal in three-inch compacted lifts. The leachate collection layer is to be constructed

with drainage sand layered between two polyester, nonwoven geotextiles to a minimum depth of eight inches. The drainage collection network will consist of a four-inch diameter Schedule 80, perforated PVC drainpipe. The secondary liner is to be constructed of six inches compacted clay monolithically combined with the primary liner. It shall be compacted to a minimum dry density of 100 percent of standard proctor with saturation after compaction at least 85 percent. The pipe shall be covered with a polyester, nonwoven geotextile and backfilled with the drainage sand.

C. The following tests will be performed at a frequency of three (3) evenly distributed preconstruction soil samples from the borrow source:

Parameters	Methods	Test Methods
Soil Type	Particle Size Analysis	ASTM D422
	Atterberg Limits	ASTM D4318
	Soil Classification	ASTM D2487
Moisture Content	Oven Dry	ASTM D2216
	Nuclear	ASTM D3017
Moisture-Density	Standard Proctor	ASTM D698
Strength	Unconfined Compressive	ASTM D2166
	Triaxial Compressive	ASTM D2850
Hydraulic Conductivity	Flexible Wall Permeameter	SW 846 Method 9100 or Equivalent

D. Construction testing frequencies shall be as follows:

soil classification	one test per 1,000 cy
particle size analysis	one test per 2,000 cy
Atterbury Limits	one test per 2,000 cy
moisture content	ones test per 500 cy
(at least one per day during compaction)	
moisture/density	one test per 5,000 cy

For construction quality evaluation after compaction, a field moisture/density test will be performed every 10,000 sf and three (3) undisturbed hydraulic conductivity tests will be performed on completed clay liners. The clay cover will be placed in accordance with the construction plans and specifications.

3.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 02222

EXCAVATION AND STAGING

SECTION 02222

EXCAVATION AND STAGING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Preparation.
2. Excavation.
3. Shoring.
4. Staging.
5. Field Quality Control.
6. Protection.

B. Related Sections

1. Section 01500: Temporary Facilities, Utilities, and Controls
2. Section 02223: Backfill and Rough Grading/Restoration
3. Section 02225: Trenching

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. The Contractor shall identify required lines, levels, contours, and datum, and verify that survey benchmark and intended elevations for the Work are as indicated. The Contractor shall notify the Engineer prior to any excavation activities such that the Engineer can schedule the Mound Construction Safety Inspector to clear the area and identify known underground, above ground, and aerial utilities. Stake and flag locations. The Contractor shall protect above and below grade utilities which are to remain, protect bench marks, existing structures, paving, and curbs from excavation equipment and vehicular traffic.

B. Prior to beginning excavation of the pit, the Contractor shall obtain and unload sufficient shoring materials to support the anticipated excavation.

3.02 EXCAVATION

A. General. The Contractor shall perform site preparation activities as specified in Section 02100: Site Preparation. Demolition of the concrete FFTA pits will be performed as specified in Section 02060: Demolition. Prior to excavation, the pit area to be excavated and underground lines to be decommissioned will be surveyed as per Section 02120: Site Survey and Survey Control.

B. Pit Excavation. The Contractor shall excavate the pit to limits specified on the Drawings and use shoring as required and specified in this Section. The Contractor shall immediately notify the Engineer of unexpected subsurface conditions and continue work only when notified to do so by the Engineer. Once the Contractor reaches the estimated limits of excavation, the Engineer will perform screening and/or verification sampling as specified in Section 02130: Soil Sampling, in order to determine if the cleanup criteiria have been achieved. The Contractor shall perform additional excavation at the direction of the Engineer, until verification sampling confirms adequate removal of contaminated soil. Backfill operations will be as specified in Section 02223: Backfill and Rough Grading/Restoration.

C. Underground Lines Demolition. Underground fuel supply and drain lines associated with past FFTA operations at locations shown on Drawings will be decontaminated as specified in Section 02110: Site Cleaning. After the area has been cleared by the Mound Construction Safety Inspector, the Contractor shall excavate down to the piping. If the Engineer deems soil removed from above the pipes to be appropriate by field screening sampling, it will be staged and used to backfill the excavation. If the material is found to be contaminated, it will be placed in the soil staging area. The Contractor shall then excavate and remove the underground piping, separating it from potentially-contaminated soil. The Contractor shall dispose of the piping as specified. Once the piping has been removed from the excavation, the Engineer will sample the soil at the base of the excavation to determine if contamination has occurred from the use of the pipes. At the direction of the Engineer, the Contractor shall excavate and stage all soil deemed by the Engineer to be contaminated above cleanup levels. The excavation will be backfilled as specified in Section 02223: Backfill and Rough Grading/Restoration following approval of the Engineer that all contaminated soil above cleanup levels has been removed.

3.03 SHORING

A. Surcharge loads due to construction equipment shall not be permitted within 5 feet (1.524 m) of the top of any excavation. Shoring or otherwise stabilizing the excavation sides will be required to reach the required depth. The Contractor shall file with the Engineer copies of drawings for the same prepared and signed by a Civil Engineer duly registered in the State of Ohio before commencing excavation. The sides of the excavation shall be supported with plank sheeting and bracing, or with an approved trench box, in such a manner as to prevent caving of the sides of the excavation. Space left by withdrawal of sheeting or shoring shall be filled completely with dry granular material blown or rammed in place. All excavations deeper than 5-feet (1.524 m) shall be shored. Shoring may be required on less than 5 feet deep over excavation.

B. Support. The Contractor is required to provide proper support for all excavations to meet OSHA requirement for access of sampling personnel, if sampling personnel must enter the excavation area. This may include benching or other excavation support methods to stabilize the sides of the excavation. Contractor will perform this work in a manner that will minimize the amount of extraneous soil excavated or shoring materials used that may have to be treated as material containing petroleum hydrocarbons.

3.04 STAGING

A. The Contractor shall stage all material from excavations deemed by the Engineer to not meet cleanup levels in the staging area.

3.05 FIELD QUALITY CONTROL

A. Field inspection will be performed by the Engineer under provisions of Section 02130: Soil Sampling. The Contractor shall provide for visual inspection of bearing surfaces.

3.06 PROTECTION

A. The Contractor shall protect excavations by methods required to prevent cave-in or loose soil from falling into excavation, and protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

3.07 MEASUREMENT AND PAYMENT

A. Separate payment will be made for excavation of contaminated soil. Include the cost of all other work in this section in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02223

BACKFILL AND ROUGH GRADING/RESTORATION

SECTION 02223

BACKFILL AND ROUGH GRADING/RESTORATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Examination.
2. Preparation.
3. Backfilling.
4. Field Quality Control.
5. Protection of Finished Work.
6. Final Grading.
7. Restoration.

B. Related Sections

1. Section 02200: Earthwork
2. Section 02222: Excavation And Staging
3. Section 02225: Trenching

1.02 REFERENCES

ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 kg) Rammer and 18 inch (457 mm) Drop.

State of Ohio Department of Transportation Construction and Material Specifications, January 1, 1993.

1.03 SUBMITTALS

A. Submit Certificates of Compliance to the Engineer before delivery of backfill or seed materials.

PART 2 PRODUCTS

2.01 BACKFILL, SAND, STONE, CLAY

A. The following suppliers have been pre-approved by EG&G Mound as acceptable sources of materials to be brought on site. If desired by the Contractor, prior approval of alternate suppliers, at no cost to Engineer, may be obtained in accordance with Mound approval procedures.

1. Crushed Stone--Mr. Ken Coats, American Aggregates Philipsburg Operation; 9843 Dayton-Greenville Pike, Brookville, OH 45309

2. Sand and Gravel--Mr. Ken Coats, American Aggregates Franklin Operation; 7533 Franklin-Trenton Road, Franklin, OH 45005

3. Sand and Gravel--Mr. Scott Weidle, Weidle Sand and Gravel; St. Rts. 4 & 123, P.O. Box 247, Germantown, OH 45327

4. Clay--Mr. Doug Jones, Broadway Sand and Gravel, 2000 Sand Ridge Road, Moraine, OH 45439 (pit located on Calumet Drive in Dayton, OH)

PART 3 EXECUTION

3.01 EXAMINATION

A. The Contractor shall verify that fill materials to be reused are acceptable to the Engineer.

3.02 PREPARATION

A. The Contractor shall compact subgrade to density requirements for subsequent backfill materials and cut out soft areas of subgrade not capable of insitu compaction, backfill with fill as specified or shown on the Drawings, and compact to density equal to or greater than requirements for subsequent backfill material.

B. Prior to placement of aggregate base course material at gravel areas, the Contractor shall compact subsoil to 90 percent of its maximum dry density in accordance with ANSI/ASTM D698. The final excavations of all remediation areas will be de-watered prior to backfilling after the verification sampling has indicated that the final depths have been achieved. Testing will be performed by the Engineer using a nuclear density gauge.

C. Before fill placement commences, and as directed by the Engineer, the exposed final excavation surfaces shall be proofrolled, where practical, using a smooth drum roller operated in the static mode in accessible shallow soil areas and by remote means (small roller attached to end of backhoe bucket similar to that used in trench backfilling operations) in pits and deep soil excavation areas. For congested shallow soil areas, a hand-operated roller or tamper of appropriate size shall be used unless otherwise specified by the Engineer. A minimum of four (4) passes of the roller or tamper shall be completed over the entire subgrade within the area to be filled. Following completion of this activity, the entire exposed surface shall be visually inspected by the Engineer.

Should any soft, loose, or otherwise unstable areas be detected by the visual inspection/probing activities, these areas shall be recompacted to densify these materials to the satisfaction of the Engineer. If these materials cannot be densified sufficiently by the additional proofrolling, they shall be stabilized with the placement of aggregate that is worked into these soft areas.

D. The Engineer will inform the Contractor when an excavated area is ready for backfilling. The Contractor shall initiate backfilling of these areas within five (5) working days.

3.03 BACKFILLING

A. The Contractor shall backfill areas to contours and elevations with unfrozen materials, systematically backfill to allow maximum time for natural settlement, and not backfill over porous, wet, frozen, or spongy subgrade surfaces.

B. Approved backfill materials shall subsequently be placed in thin horizontal lifts not exceeding a loose thickness of 12 inches unless the Engineer determines thicker layers may be allowed. Each lift shall subsequently be compacted using a smooth drum roller (operated in the vibratory mode) or other equivalent method in accessible shallow soil excavation areas, with a remote compaction method (such as a small roller attached to the end of a backhoe used in trench backfill operations) in pits and deep soil excavation areas. Backfill soils shall be compacted to a minimum of at least 90% of the Maximum Dry Density as determined by the Standard Proctor Compaction Test (ASTM D-689-78) at near optimum moisture content conditions (i.e., ± 2% of soils optimum moisture content). Adjacent to equipment foundations and under access roads a minimum compaction of 98% of the Standard Dry Density shall be obtained.

C. The Engineer may perform one in-place density tests using a nuclear density gauge every 1000 sq. ft. If sufficient compaction has not been achieved over any portion of a completed lift, the Contractor shall recompact this lift until sufficient in-place dry density is achieved.

D. The Contractor shall be required to have the Standard Proctor Compaction Test completed by a qualified geotechnical testing laboratory on each 5,000 yd^3 of approved fill material, or at any time that a significant change in physical properties of the proposed backfill soils is observed by the Contractor or the Engineer. In this manner, fill placement shall proceed to pre-construction grades unless otherwise specified or directed.

The Contractor shall employ a placement method that does not disturb or damage existing structures or utilities. The Contractor shall maintain optimum moisture content of backfill materials to attain required compaction density as required by the Engineer.

E. The Contractor shall backfill against supported structures and foundation walls and not backfill against unsupported structures or foundation walls. Unsupported foundation walls or structures shall be backfilled simultaneously on each side until supports are in place.

F. The Contractor shall slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise and approved by the Engineer. Grade changes shall be made gradual and slope shall be blended into level areas.

G. The Contractor shall remove surplus backfill materials from site and leave fill material stockpile areas completely free of excess fill materials.

3.04 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by the Engineer. Tests and analysis of fill material will be performed by the Contractor in accordance with ANSI/ASTM D698. Results of material testing shall be submitted to the Engineer for approval. Compaction testing will be performed by the Engineer in accordance with ANSI/ASTM D1556, ANSI/ASTM D1557, and ANSI/ASTM D698. If tests indicate Work does not meet specified requirements, the Contractor shall remove, replace, and retest material at no cost to the Engineer.

3.05 PROTECTION OF FINISHED WORK

A. The Contractor shall protect finished Work under provisions of Section 01500: Temporary Facilities, Utilities, and Controls. Fills subjected to vehicular traffic shall be recompacted as necessary or directed by the Engineer.

3.06 FINAL GRADING

A. The Contractor shall perform grading operations so that all excavation will be well-drained at all times. Maintain diversions and keep them free from soil, debris, and leaves until final acceptance of the work. Finish grading all excavated areas to pre-construction or natural contours or as directed by the Engineer to promote surface water drainage and to prevent ponding or collection of surface water. Perform the grading work in proper sequence with all other associated operations. Grade all areas disturbed during the work of the Contract. At trench locations, excavated and fill areas, and adjacent transition areas, grade so that finished surfaces are at the proposed grade or are approximately at grades existing prior to being disturbed. Adjust as required to provide positive drainage.

3.07 RESTORATION

A. All areas disturbed by the Contractor's operations shall be restored and restabilized. This shall include, but not be limited to, staging and stockpiling areas, access roads, and temporary erosion and sediment control structures.

B. The Contractor shall disassemble and remove all temporary construction facilities constructed by the Contractor and leave the site in an orderly and restored condition.

C. Preserve signs, markers, guard rails and fences, and maintain in their existing locations and condition unless written permission is obtained by the Engineer for their removal and restoration or replacement. The Contractor shall remove such conflicting facilities when Contractor operations begin, store in a manner to keep them clean and in their existing condition, and restore to their locations before removal or such new locations as directed by the Engineer. The Contractor shall repair or replace damaged items when directed by the Engineer, at no cost to the Engineer.

D. Restabilization of turf areas shall be performed in accordance with Section 01500: Temporary Facilities, Utilities, and Controls.

E. Existing gravel surfaces and access roads shall be restored as near as practicable to their condition prior to being disturbed or as directed by the Engineer.

F. The Contractor shall inspect the site with the Engineer and EG&G Mound to assure that the site has been properly restored to their satisfaction before the retainage is paid to the Contractor.

3.08 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02225

TRENCHING

SECTION 02225

TRENCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Examination.
2. Preparation.
3. Excavation.
4. Bedding.
5. Backfill.

B. Related Sections

1. Section 01500: Temporary Facilities, Utilities, and Controls
2. Section 02120: Site Survey and Site Control
3. Section 02200: Earthwork
4. Section 02223: Backfill and Rough Grading\Restoration
5. Section 03300: Cast-in-Place Concrete
6. Section 16010: Basic Electrical Requirements

1.02 REFERENCES

ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 kg) Rammer and 18 inch (457 mm) Drop.

State Of Ohio Department of Transportation, Construction and Material Specifications, 1 January 1993.

1.03 FIELD MEASUREMENTS

A. The Contractor shall verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe bedding material shall be ODOT Type 1B.
B. Trench backfill material shall be ODOT Type 2A and 2RC.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Contractor shall verify that fill materials to be reused are acceptable to the Engineer.

3.02 PREPARATION

A. The Contractor shall identify required lines, levels, contours, and datum. The Contractor shall maintain and protect existing utilities remaining which pass through work area, protect plant life and other features remaining as a portion of final landscaping.

B. The Contractor shall protect bench marks, existing structures, fences, paving, and curbs from excavation equipment and vehicular traffic, and protect above and below grade utilities which are to remain.

C. The Contractor shall cut out soft areas of subgrade not capable of insitu compaction. Backfill with materials as specified or shown on the Drawings and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 EXCAVATION

A. The Contractor shall excavate subsoil required for water and electrical service piping to the treatment pads as per the Drawings. The Contractor shall perform all excavating of any materials encountered and backfilling as shown or as necessary for the installation of underground conduit, duct banks, and equipment under contract.

1. Filling, backfilling, and compaction shall comply with requirements of Section 02223: Backfill and Rough Grading/Restoration. Prior to excavating or trenching, accurately locate and mark (stake) all intersections with existing buried installations shown on Contract Drawings. Notify the Engineer of completion of marking and obtain written approval (penetration/digging permit) prior to proceeding with excavation/trenching.

2. Trenches shall be excavated to a width sufficient to allow for proper jointing of the conduit and thorough compaction of the granular bedding and proper backfill material under and around the conduit except that the width of the trench at the top of the conduit shall not exceed 12 inches on each side of the conduit. Where feasible, the trench walls shall be vertical to the top of the conduit. The Contractor shall cut trenches sufficiently wide to enable installation of utilities and allow inspection.

B. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

C. The Contractor shall hand trim excavation, remove loose matter, and remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.

D. The Contractor shall correct unauthorized excavation at no cost to Engineer, and correct areas over-excavated by error in accordance with Section 02222: Excavation and Staging.

3.04 BEDDING

A. The foundation for the conduit bed shall be firm for its full length. Where unstable material is encountered, it shall be removed to a depth directed by the Engineer under the conduit and for a width on each side equal to the diameter or span of the conduit, and replaced granular materials. Rock or boulders encountered at the conduit bed shall be removed at least six (6) inches below the bottom of the conduit and replaced with granular materials. In case the depth is changed not to exceed one (1) foot, or it becomes necessary to remove unsuitable material at the direction of the Engineer in an amount not to exceed one (1) foot, the same shall be done at the Contract Bid Price. When the depth is lowered more than one (1) foot or if it becomes necessary to remove more than one (1) foot of unsuitable material below the bottom of the trench, work may be considered as an Change Order.

B. Bedding shall consist of a bed of granular material having a thickness of at least six (6) inches below the bottom of the conduit and extending up around the conduit for a depth of not less than 30 percent of its vertical outside diameter.

C. Support pipe and conduit during placement and compaction of bedding fill.

3.05 BACKFILL

A. General. The Contractor shall:

- Backfill trenches to contours and elevations with unfrozen materials.
- Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

B. Bedding. Place and compact materials in continuous layers not exceeding 12 inches compacted depth.

C. Trench Backfill. Place and compact material in continuous layers not exceeding 12 inches compacted depth.

D. Employ a placement method that does not disturb or damage foundation perimeter drainage, conduit duct in trench, or other activities or structures.

E. Maintain optimum moisture content of backfill materials to attain required compaction density.

F. Remove surplus backfill materials from site.

G. Leave fill material stockpile areas completely free of excess fill materials.

3.06 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 02223: Backfill and Rough Grading/Restoration, or as necessary by the Engineer.

B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Section 02223: Backfill and Rough Grading/Restoration.

C. Compaction testing will be performed in accordance with ANSI/ASTM D1556.

D. If tests indicate Work does not meet specified requirements, the Contractor shall remove Work, replace and retest at no cost to Engineer.

3.07 PROTECTION OF FINISHED WORK

A. The Contractor shall protect finished Work under provisions of Section 01500: Temporary Facilities, Utilities, and Controls.

3.08 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02513

ASPHALTIC CONCRETE

SECTION 02513

ASPHALTIC CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Description. The Contractor shall furnish all tools, equipment, materials, and supplies and shall perform all labor necessary for the furnishing, placing, and compacting of asphalt concrete pavement and base to the lines, grades, and dimensions to meet existing conditions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphaltic Concrete Paving shall conform to Ohio Department of Highway Standards for E mix.

PART 3 EXECUTION

3.01 DESCRIPTION

The asphalt concrete paving shall have the following configuration:

A. Aggregate Base Course. Minimum 4-inch aggregate base course maximum size 1-1/2 inch.

B. Prime Coat. Prime coat shall be in conformance with the applicable requirements of Sections 203-2 and 302-5 of the Standard Specifications for Public Works Construction (SSPWC) and shall be applied at a rate of 0.25 gallons per square yard.

C. Asphaltic Concrete Base Course. Asphaltic concrete base course shall conform to Ohio Department of Highway mix design for Hot Bituminous Pavement Grading E and shall be minimum of 4 inches thick.

D. Tack Coat. Tack coat shall be in conformance with applicable requirements of Sections 203-0 and 302-5 of SSPWC and shall be applied at a rate of 0.10 gallons per square yard.

E. Asphaltic Concrete Surface. Asphaltic concrete surface shall be minimum 2 inch thick.

3.02 PLACEMENT

A. All material shall be placed in accordance with Ohio Department of Highway standard specifications. Finished surface shall not vary more than 1/4 inch when tested with a 16 foot straight edge.

3.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 02561

MANHOLES

SECTION 02561

MANHOLES

PART 1 GENERAL

1.01 SUMMARY

A. Description.

1. This section provides for the construction of manholes complete in place.

B. Related Sections

1. Section 02223: Backfill and Rough Grading/Restoration
2. Section 03300: Cast-in-Place Concrete
3. Section 16010: Basic Electrical Requirements

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with the requirements of Section 01340: Shop Drawings, Product Data And Samples, and the supplemental requirements below.

1. Proposed manholes and steps for each type and size required, including specific location of manhole.

PART 2 PRODUCTS

2.01 MATERIALS FOR SEWER MANHOLES

A. Except as otherwise specified, furnish materials according to the requirements of the reference standard.

2.02 PRECAST CONCRETE MANHOLES

A. Provide precast concrete manhole sections, bottoms, and flat top slabs conforming to the requirements of ASTM C478. Provide risers and cones with dimensions as shown on the Drawings.

1. Use eccentric cone sections for manholes unless otherwise indicated on Drawings.

B. Concrete

1. Provide 3,500 psi concrete using Type 1 Portland cement complying with ASTM C150.

C. Mortar

1. Mix one part Portland cement to three parts fine aggregate.

D. Joints

1. Provide tongue and groove joints with either flexible watertight rubber gaskets or preformed bituminous plastic gaskets consisting of a homogenous blend of refined hydrocarbon resins and plasticizing compound reinforced with inert mineral filler.

2. Acceptable preformed products

   a. K.T. Snyder Co., Ram-nek
   b. Concrete Sealants, Type CS-102
   c. any equivalent of the above products

E. Steps

1. Steel reinforced plastic, such as copolymer polypropylene meeting the requirements of ASTM Designation 2146 Type II Grade 49108 reinforced with a deformed 1/2-inch diameter reinforcing bar which conforms to the requirements of ASTM Designation A-615 Grade 60.

2. Gray cast iron conforming to requirements of ASTM Designation A-48, Class No. 30B and shall have a minimum cross-sectional dimension of 1 inch in any direction.

3. Round steps are not acceptable.

F. Frames and Covers. ASTM A48, Class No. 30B gray cast iron; self-sealing type with concealed pick holes, except where indicated on Drawings.

G. Interior Impermeable Coating. Compatible with stored waste, impermeable to intrusion of liquids, compatible with concrete.

PART 3 EXECUTION

3.01 PRECAST CONCRETE MANHOLES IN EXCAVATED PIT

A. Excavate the pit for a manhole structure no wider than the manhole diameter plus 4 feet, allowing 2 feet around the structure. Manhole pit excavation is unclassified.

B. The manhole base may be either cast-on-site or monolithic round, precast reinforced concrete base sections. The bottom or floor of precast base sections shall have a minimum thickness of 12 inches beyond the outside walls of the base to form a flange intended to resist uplift.

C. The precast concrete base shall have suitable cutouts or holes to receive all pipe and connections. All undesirable material such as organic soils, etc., which cannot support the manhole shall be removed and replaced with crushed stone. A minimum of 3 inches

of crushed stone below the manhole bottom shall be included in the cost of the manhole.

D. Manholes shall be built up so that the cover, when placed, shall be at the designated elevation. No less than two precast concrete grade rings, with a total thickness of not more than 8 inches, shall be placed under the casting.

1. Provide flexible rubber gasket collar for connecting pipe to the manhole or as shown on the Drawings.

2. Place all precast sections to provide vertical alignment of steps and rigid, watertight finished unit true to dimensions.

3.02 BACKFILL

A. Use the same material and procedures for manhole structure as other backfill. See Section 02200: Earthwork.

3.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Section 03200: Concrete Reinforcement.
B. Section 03300: Cast-In-Place Concrete.

1.02 QUALITY ASSURANCE

A. Design Criteria. Formwork shall be designed and constructed in accordance with ACI 347 and with controlling local building code.

B. Allowable Tolerances. Formwork shall be constructed to produce concrete surfaces conforming to tolerances specified in ACI 301, Table 4.3.1.

C. Reference Standards

1. American Concrete Institute (ACI)

a. ACI 301 Specifications for Structural Concrete for Buildings.
b. ACI 347 - Recommended Practice for Concrete Formwork.

2. American Institute of Steel Construction (AISC) Manual of Steel Construction

3. American Iron and Steel Institute (AISI) Cold-Formed Steel Design Manual.

4. National Forest Products Association (NFPA) National Design Specification for Stress Grade Lumber and Its fastenings.

5. U.S. Department of Commerce

a. PS 1 Construction and Industrial Plywood
b. PS 20 American Softwood Lumber

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Wood

1. Solid lumber. Use stress-graded lumber having adequate strength and properties to safely support anticipated loads, and conforming to NFPA Specifications and PS 20. Use dressed and matched boards of uniform thickness and width for exposed concrete surfaces.

2. Plywood. Use Plyform Class 11, 5.8-inch BB-Exterior Type, mill-oiled and edge sealed. Use HDO Plyform Class I where rubbed finish is indicated. Plywood shall conform to PS 1.

B. Metal. Steel for panel framing and bracing, panel systems, and falsework shall conform to AISC and AISI Specification.

2.02 ACCESSORIES

A. Form Ties

1. Form ties for liquid containment structures shall have waterstops and shall be non-removable.

2. Design form ties to provide adequate strength for holding forms. Ties shall be fixed or adjustable in length, and shall contain no devices capable of leaving holes larger than 7/8 inch in diameter in concrete surface.

3. Non-removable ties shall be supplied with conditions for positive breakoff or for internal disconnection. Metal remaining after removal of external tie parts shall not be left closer than 1-1/2 inches to finished concrete surface. Flat ties providing no positive breakoff will not be permitted.

B. Chamfers. Use PVC, rubber, or wood chamfers to produce uniform smooth external corners and tight edged joints. Use 3/4" x 3/4" chamfers unless noted otherwise on PLANS.

C. Form Coating. Use bond breaking, non-staining form coating agent conforming to ACI 347. Form coating agent shall be non-toxic after 30 days for liquid containment structures. Form coating agent shall not soften concrete and shall be compatible with paint, waterproofing material, or dampproofing material to be applied to finished surface.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to form construction, clean mortar and grout remaining from previous concreting operations from form surfaces.

3.02 FORM CONSTRUCTION

A. Forms shall be constructed to conform to required shape, form, line, and grade, and shall have sufficient rigidity to maintain specified tolerances.

B. Form joints shall be leakproof and arranged vertically and horizontally to conform to design pattern, if any. Forms placed on successive units for continuous service shall be fitted to accurate alignment to assure a smooth, completed surface free from irregularities.

C. In long spans where intermediate supports are not possible, form deflection due to weight of fresh concrete shall be computed. Design forms to account for deflection in order to produce finished concrete members having true surfaces conforming accurately to desired lines, planes and elevations.

D. Provide positive means for shore and strut adjustments. Settlement shall be taken up during concrete placing operation. Brace forms securely against lateral deflections.

E. Provide temporary openings in wall and column forms to facilitate cleaning and inspection. Wall sleeves, inserts, wall pipes, anchor bolts, dovetail anchor slots, and openings required in concrete work shall be accurately set in formwork.

F. Form exposed external concrete corners with chamfers. Chamfers shall be accurately placed and secured to form uniformly straight lines, and shall be metered at changes in direction. Do not install chamfers where masonry wall units abut and are flush with concrete.

G. Coat wood and steel forms with form coating agent prior to placing reinforcement. Do not allow excess form coating agent to stand inside forms or to come into contact with fresh concrete. Use form coating agent in strict accordance with manufacturer's recommendations. Form ties to be completely withdrawn shall be coated with grease.

3.03 FORM AND SHORE REMOVAL

A. Form and shore removal shall be in accordance with ACI 301.

B. Formwork that does not support weight of concrete, such as sides of beams, walls, columns, and similar vertical parts of the work, may be removed 24 hours after placing concrete, provided concrete is sufficiently hard not to be damaged from form removal operations.

C. Formwork that supports weight of concrete, such as beam soffits, slabs, and similar horizontal parts of the work, shall remain in-place at least until concrete has attained design minimum laboratory compressive strength at 28 days for applicable concrete class specified.

D. Form facing material may be removed before concrete has attained its required 28-day compressive strength, but in no case less than six days after placing concrete, provided shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports. Shores and other vertical supports shall remain in-place until concrete has attained its required 28-day compressive strength.

E. Remove forms in a manner to assure complete structure safety. Do not remove shoring until supported member has acquired sufficient strength to support its weight and superimposed loads. Superimposed loads shall not exceed design live load unless members are adequately shored to support both the members and construction loads in a manner to protect members from damage. Formwork may be removed after expiration of time periods listed in ACI 347, provided concrete will not be injured, damaged, or overstressed.

F. Clamps for tie-rods to be entirely removed from wall shall be loosened 24 hours after concrete is placed and form ties, except for sufficient number to hold forms in place, may be removed at that time. Remove standard snap ties when forms are stripped. Ties wholly withdrawn from wall shall be pulled toward inside face.

G. The Contractor shall ensure that newly unsupported portions of the structures are not subjected to heavy construction or material loading.

3.04 ADJUSTMENT AND CLEANING

A. Forms to be reused shall be maintained clean and in good condition as to accuracy, shape, strength, rigidity, tightness, and surface smoothness. Do not use damaged forms or forms producing work not equal to work resulting from using new materials.

3.05 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 RELATED WORK

A. Section 03100: Concrete Formwork.
B. Section 03300: Cast-In-Place Concrete.

1.02 QUALITY ASSURANCE

A. Allowable Tolerances. Fabricating and placing tolerances shall comply with ACI 301.

B. Reference Standards

1. American Concrete Institute (ACI)
   a. ACI 301 Specifications for Structural Concrete for Buildings.
   b. ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   c. ACI 318-89 Building Code Requirements for Reinforced Concrete.

2. American Society for Testing and Materials (ASTM)
   a. A185 Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement.
   b. A615 Standard Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement.

3. Concrete Reinforcing Steel Institute (CRSI).

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings and Product Data in accordance with the requirements of Section 01340 and the supplemental requirements below.

1. Mill Reports. Certified mill reports shall accompany reinforcing steel deliveries.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Ship reinforcing steel to job site properly bundled and tagged to facilitate identification.

PART 2 PRODUCTS

2.01 MATERIALS

A. Deformed bars shall conform to ASTM A615, Grade 60.

B. Welded wire fabric shall conform to ASTM A185. Welded wire fabric shall be supplied as flat sheets or mats.

C. Tie wire shall be 16 gauge or heavier black annealed wire.

D. Bar supports shall comply with CRSI Manual and ACI 315, Chapter 7, Detailing Manual.

1. Use Class C bar supports at exposed surfaces and in water containment and treatment structures and Class D at other locations.
2. Precast concrete blocks may be used to support bottom bars in footings and slabs on ground.

E. Mechanical connectors shall comply with the requirements of ACI Std. 318-89 for a full mechanical connection and as follows:

1. Develop in tension and compression, as required, at least 125 percent of the specified yield strength of the bar.
2. Connectors shall be threaded using an easy to duplicate thread, common to all connectors in this contract.
3. Connectors shall each be provided with a protective cover and coating capable of maintaining the threads in like new condition for at least 10 years of moist soil contact.

2.02 FABRICATION

A. Reinforcing steel shall be accurately cut and cold bent in shop to dimensions indicated on Drawings. Bar bends shall comply with CRSI Manual and ACI 315, Detailing Manual.

PART 3 EXECUTION

3.01 CLEANING

A. Metal reinforcement at time concrete is placed shall be free from mortar, mud, ice, oil, or other nonmetallic coatings adversely affecting bonding capacity. Reinforcement with rust or mill scale shall be considered satisfactory, provided minimum dimensions, including deformation height and weight of hand wire brushed test specimen, are not less than applicable ASTM specification requirements.

3.02 PLACING

A. Place reinforcement in positions and with spacings shown on Drawings. Reinforcement placing shall conform to recommended practices in CRSI "Placing Reinforcing Bars" and Chapter 7 of ACI 318-89. Do not place bars with kinks or bends not shown on Drawings. Do not heat reinforcement for bending or straightening, and do not bend reinforcement embedded in hardened concrete.

B. Use precast concrete blocks to support horizontal reinforcing bars in footings and slabs on ground. Use chairs, spacers, and bolsters to support horizontal reinforcing bars over formwork.

C. Accurately tie reinforcement at intersections with 16 gauge black annealed wire. Do not tack weld reinforcing bars at their intersections. Use two ties minimum per splice. Point tie wire ends away from forms and concrete surfaces.

D. Except where noted on Drawings, lap splices shall be Class "B" conforming to ACI 318. Splices for horizontal reinforcement in circular tanks shall be 40 bar diameters minimum and splice locations shall be staggered. Splices not shown on Drawings shall be approved by Engineer. Vertical reinforcing bars in columns shall be offset one bar diameter at lapped splices.

E. Reinforcing bar embedment (Development) length and bar hook radius length shall be as indicated on the Drawings and conform to ACI 318-89, Chapter 12. The bar hook radius length for bar size #3 through #8 shall be 8 bar diameters and the hook radius length for bar size #9 through #11 shall be 10 bar diameters.

F. Reinforcing bars may be moved one bar diameter maximum to avoid interference with other reinforcing steel, conduits, or embedded items. Engineer shall approve moving reinforcing bars more than one bar diameter to avoid interferences.

G. Place and secure welded wire fabric to prevent displacement during concrete placement. Support fabric in structural slabs in accordance with requirements for supporting reinforcing bars. Support fabric in slabs on ground in accordance with requirements for supporting reinforcing bars or by laying fabric on correct depth of fresh concrete prior to placing upper layer of slab concrete. Extend fabric across supporting beams and walls and to within 2 inches of concrete edges.

H. Welded wire fabric shall be overlapped wherever successive mats are continuous. Overlap measured between outermost cross wires of each fabric sheet shall not be less than spacing of cross wires plus 2 inches.

3.03 CONCRETE PROTECTION FOR REINFORCEMENT

A. Reinforcing steel shall be protected by concrete covering shown on Drawings or specified herein. Where covering thickness is not shown, following values shall be used.

1. Footings and other principal structural members cast against ground: 3 inches.

2. Concrete surfaces exposed to weather or in contact with ground or water after form removal: 2 inches.

3. Slabs not exposed to weather but over water: 1-1/2 inches.

4. Slabs, walls, and joints not exposed to ground, water, or weather: 1 inch.

5. Principal reinforcement, ties, stirrups, or spirals for beams, girders, and columns: 1-1/2 inches.

6. Concrete in contact or exposed to sewage or sewage gases: 4 inches.

3.04 MEASUREMENT AND PAYMENTS

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED WORK

A. Section 02561: Manholes
B. Section 03100: Concrete
C. Section 03200: Concrete Reinforcement

1.02 QUALITY ASSURANCE

A. Specimen preparation and testing shall be performed by independent testing agency employed by the Contractor and approved by the Engineer. Additional testing required due to concrete not meeting specification requirements shall be at Contractor's expense.

B. Allowable Tolerances

1. Finishing Tolerances for Slabs

a. Finishes with Class A tolerances shall be true planes within 1/8 inch in 10 feet as determined by 10 foot straightedge placed anywhere on slab in any direction.
b. Finishes with Class B tolerances shall be true planes within 1/4 inch in 10 feet, as determined by 10 foot straightedge placed anywhere on slab in any direction.
c. Finishes with Class C tolerances shall be true planes with 1/4 inch in 2 feet, as determined by 2 foot straightedge placed anywhere on slab in any direction.

2. Compression test results shall be evaluated separately for each specified concrete mix design in accordance with ACI 214. Strength level of concrete will be considered satisfactory if the average of all sets of three (3) consecutive strength test results for laboratory-cured specimens equal or exceed the specified compressive strength and no individual strength test result falls below the specified compressive strength by more than 500 psi.

C. Chapter 18 of ACI 301 shall provide requirements for Engineer's acceptance of concrete structures and appurtenances.

D. Reference Standards

1. American Concrete Institute (ACI)

ACI 211.1	Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete.
ACI 214	Recommended Practice for Evaluation of Compression Test Results of Field Concrete.
ACI 301	Specifications for Structural Concrete for Buildings.
ACI 304	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
ACI 305	Recommended Practice for Hot Weather Concreting.
ACI 306	Recommended Practice for Cold Weather Concreting.
ACI 309	Recommended Practice for Consolidation of Concrete.
ACI 318	Building Code Requirements for Reinforced Concrete.
ACI 350R	Concrete Sanitary Engineering Structures.

2. American Society for Testing and Material (ASTM)

C31	Standard Method of Making and Curing Concrete Test Specimens in the Field.
C33	Standard Specification for Concrete Aggregates.
C39	Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens.
C42	Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
C94	Standard Specification for Ready-Mixed Concrete.
C143	Standard Method of Test for Slump of Portland Cement Concrete.
C150	Standard Specification for Portland Cement.
C171	Standard Specification for Sheet Materials for Curing Concrete.
C172	Standard Method of Sampling Fresh Concrete.
C231	Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method.

C260	Standard Specification for Air-Entraining Admixtures for Concrete.
C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
C618	Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolans for Use in Portland Cement Concrete.
C881	Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
D994	Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
D1752	Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
E96	Standard Test Methods for Water Vapor Transmission of Materials in Sheet Form.
E329	Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction.

3. U.S. Army Corps of Engineers Handbook for Concrete and Cement. CRD-C572 Polyvinylchloride Waterstops.

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of Section 01340 and the supplemental requirements below.

1. Contractor shall furnish one cubic foot standard sample of coarse aggregate and one cubic foot standard sample of fine aggregate upon Engineer's request.

2. Submit concrete mix design for each class of concrete to Engineer for approval prior to construction.

3. Concrete test results shall be furnished by independent testing laboratory directly to Engineer and Contractor.

4. Furnish delivery ticket with each concrete load delivered to job site. Ticket shall show class and strength of concrete, number of pounds of cement, size of coarse aggregate, batching time, slump ordered, and amount and types of admixture.

5. Submit manufacturer's product data sheets for all proposed admixtures.

6. Submit Drawings indicating construction joint locations not indicated on Drawings to Engineer for review prior to placing concrete.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Products shall be handled in accordance with the requirements of Section 01620 and the supplemental requirements below.

1. Immediately upon receipt at central batch plant, store cement in dry, weathertight, properly ventilated structure. Prevent cement from absorbing moisture.

2. Aggregate storage piles shall afford good drainage, preclude inclusion of foreign matter, and preserve gradation.

3. Store admixtures to avoid contamination, evaporation, or damage. Protect liquid admixtures from freezing and from temperature changes adversely affecting admixture characteristics.

4. Store fly ash in dry, weathertight, properly ventilated structure. Prevent fly ash from absorbing moisture. Clearly mark structures containing fly ash.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Hot weather concrete placement shall be in strict accordance with ACI 305. Maintain subgrades moist or lay waterproof sheathing paper on subgrade to prevent water extraction from concrete. At time of placement, mix temperature shall not exceed 90 degrees F.

B. Cold weather concrete placement shall be in strict accordance with ACI 306. When ambient temperature is below 40 degrees F, mix temperature shall not be less than 50 degrees F or more than 70 degrees F at time of placement.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement. Use Portland cement conforming to ASTM C150. Use one cement brand for exposed concrete in any individual structure. Do not use cement reclaimed from leaking containers. Use cement in sequence of shipment receipt.

1. Use Type II cement for structures containing water or liquid.

B. Coarse Aggregate. Use crushed limestone, granite or washed natural river rock conforming to ASTM C33 except that clay and shale particles shall not exceed one percent. Use largest aggregate size possible but not greater than 1/5 the narrowest dimension between sides of forms, 1/3 slab depth, 3/4 minimum clear spacing between individual reinforcing bars, nor 3/4 clear spacing between reinforcing bars and forms.

C. Fine Aggregate shall be well graded natural sand conforming to ASTM C33, except that clay and shale particles shall not exceed one percent. In addition to grading

requirements of ASTM C33, fine aggregate shall be graded such that 15-30 percent passes No. 50 sieve and 3-7 percent passes No. 100 sieve.

D. Water shall be clean, potable, and free from deleterious amounts of oils, acids, alkalies, salts, and organic materials.

E. Admixtures

1. Air-entraining agents shall conform to ASTM C260 and shall contain no chlorides.

2. Fly ash shall conform to ASTM C618.

3. Do not use calcium chloride in concrete containing aluminum items.

4. Water reducer and super water reducer admixtures shall conform to ASTM C494.

F. Curing Materials

1. Absorptive cover shall be burlap, cotton mats or clean sand. Burlap shall not contain sizing or other substances injurious to Portland cement or causing discoloration.

2. Moisture retaining cover shall be polyethylene film or waterproof paper conforming to ASTM C171. Color shall be white.

3. Membrane curing compound shall conform to ASTM C309, Type 1-D.

G. Premolded joint filler shall conform to ASTM D994 for asphalt joint filler and to ASTM D1752, Type I for sponge rubber and Type III for self-expanding cork.

H. Vapor Barrier Sheet shall include two (2) sheets of kraft paper laminated with asphalt and reinforced with glass fibers in two (2) directions. Top and bottom shall be extrusion-coated with black polyethylene. Sheet shall have 0.10 perm rating when tested in accordance with ASTM E96.

I. Epoxy Bonding System shall conform to ASTM Specification C881, Type II.

J. Rigid insulating board shall be polystyrene rigid insulation conforming to Federal Specification HH-1-5246, Type II, Class B. Compressive strength of insulation shall not be less than 20 psi.

2.02 MIX DESIGN

A. Design concrete mix in accordance with these Specifications and ACI 211.1.

B. Various concrete classes required shall be proportioned to give the following tabulated minimum strengths and shall not exceed listed maximum water-cement ratio.

MINIMUM STRENGTH			
Class of Concrete	Max Water-Cement Ratio lb/lb	28 Day Cyl., psi	
		Field Cured	Lab Cured
A	0.45	2,800	4,000
B	0.50	2,400	3,400
C	0.50	2,000	2,800
D	0.50	1,250	1,800

1. Class "A" concrete shall be used for general concrete work including steel reinforced structural building elements, tanks, appurtenant structures, slabs on ground, and equipment foundation pads.

2. Class "B" concrete shall be used for concrete paving, curb and gutter, sidewalks, and where specifically indicated on Drawings.

3. Class "C" concrete shall be used for unreinforced concrete work, including fill concrete in hydraulic structures.

4. Class "D" concrete shall be used for foundation seal slabs, and work mats.

C. Slumps shall not exceed maximum or be less than minimum tabulated values for corresponding type of construction.

SLUMP		
Type of Construction	Maximum	Minimum
Walls, Columns	4 inch	1 inch
Formed Slabs, Beams, Girders	4 inch	1 inch
Fittings & Slabs on Ground	3 inch	1 inch
Sidewalks & Curb & Gutter	3 inch	1 inch
Mass Concrete Sections	3 inch	1 inch
Fill Concrete	3 inch	1 inch

For Class "A" through "D" concrete artificial, chemically induced, slump up to a maximum of 8 inches may be produced by the addition of high range water reducer admixture in all types of construction. High range water reducer must maintain cohesiveness and be able to maintain the slump without free water for at least 1½ hours.

D. Class "A" and "B" concrete shall be air-entrained. Total air content by volume shall be as tabulated for indicated maximum aggregate sizes. Air-entraining agent shall be dispensed separately into concrete mix in an amount required to attain the specified quantity of entrained air. Use admixture in strict accordance with manufacturer's recommendations.

Maximum Agg. Size	Air Content (+1 Percent)
3/8"	6.5
1/2"	6.0
3/4"	5.0
1-1/2"	4.5
3"	3.5

E. Fly ash may be used at Contractor's option.

1. Maximum water-cement ratios listed in Paragraph B above for various concrete classes shall apply to maximum water-cement plus fly ash ratios.

2. Fly ash shall replace part of the cement but shall not exceed 25 percent by weight of cement plus fly ash (3 parts cement, 1 part fly ash).

2.03 READY-MIXED CONCRETE

A. Ready-mix concrete delivered to the job site shall comply with these Specifications and to ASTM C94. Engineer shall have free access at all times to the batching and mixing plant for material sampling and inspection.

2.04 SITE-MIXED CONCRETE

A. Batching plant and mixing equipment for Concrete mixed at job site shall comply with ASTM C94. Concrete shall comply with these Specifications. Concrete production shall comply with ACI 301.

PART 3 EXECUTION

3.01 PREPARATION

A. Place vapor barrier sheet under slabs and where indicated on Drawings. Lap joints 6 inches minimum and seal.

B. Remove water from excavation prior to placing concrete. Divert flowing water through side drains to prevent water from flowing over freshly deposited concrete. Remove hardened concrete, debris, ice, and other foreign materials from inside forms and from inner surfaces of mixing and conveying equipment. Reinforcement shall be secured in position and inspected. Provide runways for wheeled concrete handling equipment. Do not place concrete on frozen ground. Subgrade shall be moist at time concrete is deposited.

C. Foundation Perimeter

1. Install boards on foundation walls vertically from base of foundation to top of insulation.

2. Stagger joints.

3. Butt edges and ends tight to adjacent boards and protrusions.

4. Install in accordance with manufacturers recommendations.

3.02 INSTALLATION

A. Notify Engineer 24 hours minimum prior to placing concrete. Concrete shall be transported and placed in accordance with ACI 304.

B. Concrete shall be handled from mixer to final place of deposit in continuous manner, as rapidly as practicable, and without segregation or loss of ingredient until unit of operation is completed. Each concrete layer shall closely follow preceding layer placement to prevent formation of seams and planes of weakness within the section. Concrete reaching initial set or containing water for more than 1-1/2 hours shall not be deposited in the work.

C. Place concrete into forms in uniform layers as nearly to final position as practicable. Consolidate concrete immediately after placing by thoroughly agitating mass with mechanical, internal vibrating equipment to force out air pockets, to work mixture into corners and around reinforcement and inserts, and to prevent void formation. Do not use vibrators to move concrete horizontally. Internal vibrator shall maintain speed of 8,000 impulses per minute when submerged in concrete. Maintain one (1) Spare vibrator minimum at job site. Limit vibration time to produce satisfactory consolidation without causing objectionable segregation. Concrete consolidation shall comply with ACI 309.

D. Do not allow concrete to drop freely more than five (5) feet. Use elephant trunks or tremies where greater drops are required. This may be increased in thick (>2'-0") wall placements only if it is clearly demonstrated to the Engineer that segregation is not occurring due to concrete bouncing off of rebar, etc. At least the first two feet of each wall placement shall always be placed with a tremie. Control tremie discharge to allow concrete to be effectively compacted into horizontal layers not exceeding 12 inches in thickness with minimum lateral movement. Do not use aluminum chutes, tremies, or pipes.

3.03 REPAIR OF SURFACE DEFECTS

A. Surface defects, including tie holes, shall be repaired immediately after form removal.

B. Honeycombed and defective concrete shall be removed down to sound concrete. Edges of chipped areas shall be perpendicular to surface or slightly undercut. No featheredges will be permitted.

C. Area to be patched and area at least 6 inches wide surrounding area to be patched shall be dampened to prevent water absorption from patching mortar. After surface water has evaporated from area to be patched, bond coat shall be well brushed into the surface. When bond coat begins to lose water sheen, premixed patching mortar shall be applied. Mortar shall be thoroughly consolidated into place and struck off to leave patch slightly higher than surrounding surface. Patch shall be left undisturbed for one (1) hour minimum before being finally finished. Patched area shall be maintained damp

for seven (7) days minimum. Metal tools shall not be used in finishing patch in formed wall exposed to view in final structure.

D. After being cleaned and thoroughly dampened, tie holes shall be filled solid with patching mortar.

E. Bond coat shall consist of approximately one (1) part cement to one (1) part fine sand passing No. 30 mesh sieve, mixed to consistency of thick cream.

F. Patching mortar shall be made from same materials and in approximately same proportions as used for concrete, except coarse aggregate shall be omitted and mortar shall contain not more than one (1) part cement to two and one- half (2-1/2) parts sand by damp loose volume and also include a non-metallic, non-shrink additive. Substitute white Portland cement for portion of gray cement on exposed concrete in order to produce color matching surrounding concrete, as determined by trial patch. Use no more water than necessary for mortar handling and placement. Mix mortar in advance and allow mortar to stand. Frequently manipulate mortar with a trowel, without adding water, until mortar has reached stiffest consistency that will permit placing.

3.04 CONCRETE FINISHES - FORMED SURFACES

A. After form removal, hardened concrete surfaces shall receive one or more finishes specified below. Unless noted otherwise on Drawings or specifications, exterior below grade surfaces shall receive rough form finish, and all other surfaces shall receive a smooth rubbed finish.

B. Rough Form Finish: Remove fins, burrs, and other projections exceeding 1/4 inch in height left after form removal. Patch tie holes and defects.

C. Smooth Form Finish: Form facing material shall produce smooth, hard, uniform texture on concrete. Facing material shall be arranged in orderly and symmetrical manner, with number of seams kept to practical minimum. Forms shall be supported to prevent excessive deflection. Tie holes and defects shall be patched. Fins shall be completely removed.

D. Smooth Rubbed Finish: Finish shall be applied to concrete with smooth form finish. Rub wetted surfaces with carborundum stone to eliminate irregularities and to produce uniform, even-textured surface. Bulging or protruding areas resulting from slipping or deflecting forms shall be ground flush with adjacent surfaces. Do not apply cement grout to surfaces to be rubbed. Forms shall be removed and necessary patching completed as soon after concrete placement as possible without jeopardizing structure. Apply rubbed finish no later than one (1) day following form removal. Unless noted otherwise, use finish for concrete exposed in finished work and for concrete surfaces in contact with water or liquid.

E. Tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to texture reasonably consistent with that of formed surfaces. Final treatment on formed surfaces shall continue uniformly across unformed surfaces.

3.05 CONCRETE FINISHES - SLABS

A. Scratched Finish. After concrete has been placed, consolidated, struck off, and leveled to Class C tolerance, roughen surface with stiff brushes or rakes prior to final set. Unless noted otherwise, use finish on slabs to receive mortar setting beds for quarry tile, ceramic tile, terrazzo, or similar type wearing surfaces and on slabs to receive Portland cement grout swept in by process mechanical equipment.

B. Floated Finish. After concrete has been placed, consolidated, struck off, and leveled, concrete shall not be worked further until ready for floating. Begin floating when water sheen has disappeared and concrete has sufficiently hardened to bear man's weight without deep imprint. Prevent formation of laitance and excess water on finished surface. During first floating, cut down high spots and fill low spots to produce surface with Class B tolerance throughout. Slab shall be refloated immediately to uniform sandy texture. Unless noted otherwise, use finish for curbs and gutters, interim steps, and surfaces to receive roofing or waterproofing materials.

C. Troweled Finish. After applying floated finish to floor slab and when concrete has hardened sufficiently to prevent excess fine material from working to surface, apply first trowel finish with power driven trowel. Additional trowelings shall be done by hand. Final troweling shall be done when ringing sound is produced as trowel is moved over concrete surface. Surface shall be thoroughly consolidated by hand troweling operations. Finished surface shall be free of trowel marks, uniform in texture and appearance, and plane to Class A tolerance. Defects of sufficient magnitude to show through floor covering shall be removed by grinding. Unless noted otherwise, use finish on slab surfaces to be exposed to view, surfaces to be covered with resilient flooring, paint, or other thin film finish coating system, and surfaces in contact with process water or liquid.

D. Broom Finish. Give concrete surface transverse scored texture by drawing metal tinned broom across surface immediately after applying floated finish. Unless noted otherwise, use finish on exterior ramps, platforms, sidewalks, and steps.

3.06 CURING

A. Curing shall be accomplished by preventing loss of moisture, rapid temperature change, and mechanical injury for seven (7) days minimum following concrete placement. Protect fresh concrete from heavy rains, flowing water, and freezing temperatures. Begin curing as soon after placing and finishing as free water has disappeared from concrete surface. The Contractor may select one of the approved curing methods unless a specific method has been specified. Curing methods shall be in accordance with ACI 308.

1. Saturation Curing. Curing of concrete shall be by water saturation using methods which will keep the concrete surfaces adequately wet during the specified curing period. Water saturation of concrete surfaces shall begin as quickly as possible after initial set of the concrete. The rate of water application shall be regulated to provide complete surface coverage with a minimum of runoff. The application of water to walls may be interrupted for grout cleaning only over the areas being cleaned at the time, and the concrete surface shall not be permitted to become dry during such interruption.

The use of membrane curing compound or moisture retaining cover in lieu of water curing will not be acceptable except for roadway and walkway surfaces.

2. Moist Curing. Cover unformed surfaces with absorptive cover and maintain surface is continuously wet.

3. Moisture Retaining Cover. Cover surfaces with waterproof paper or polyethylene sheet. Lap sheet edges and ends 4 inches minimum and seal with mastic or pressure-sensitive tape. Sheets shall be weighted to prevent displacement. Patch holes and tears immediately.

4. Membrane Curing. Apply membrane curing compound, which complies with ASTM-C 309-81, with power spraying equipment using spray nozzle equipped with wind guard to flat surfaces. Use a roller to apply compound to walls and overhead surfaces. Apply compound in two-coat continuous operation. Apply second coat in direction approximately at right angles to first coat direction. Compound shall form uniform, continuous, adherent film. Film shall not check, crack, or peel and shall be free from pinholes and other imperfections. Surfaces subjected to heavy rainfall within three (3) hours after compound has been applied or surfaces damaged by subsequent construction operations within curing period shall be reapplied. Protect surfaces coated with curing compound from foot and vehicular traffic and other sources of abrasion during curing period. Do not use membrane curing compounds on surfaces to receive deferred toppings, additional concrete placement, quarry tile grouts, liquid membrane waterproofing compounds or resilient floor tile, or on surfaces to be painted. Apply membrane curing compound in strict accordance with manufacturer's recommendations.

5. Forms Left in Place. Where curing is accomplished by leaving forms in place, the top exposed concrete surfaces and the forms shall be maintained continuously wet. After form removal, concrete shall be cured by other approved methods for remainder of required curing period.

   Form removal shall be in strict accordance with ACI 318, Chapter 6 and Section 03100 of these specifications.

3.07 JOINTS

A. Construction joints shall be keyed with keyways at least 1-1/2" deep and located as shown on Drawings unless otherwise approved by the Engineer. All walls and slabs continuous in one direction more than 60 feet shall be placed in alternating patterns such that construction joints are at no more than 60-foot intervals and at least 3 days elapse between placement of adjacent sections. Joints not shown on Drawings shall be located as not to significantly impair the strength of the structure and shall be approved by Engineer. Joints shall be located as follows:

1. In walls at not more than 60 feet in any horizontal direction; at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into wall.

2. In columns or piers; at top of footings; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.

3. Near midpoint of spans for supported slabs, beams, and girders unless a beam intersects a girder at the center, in which case construction joints in girder shall offset a distance to twice the width of the beam. Transfer of shear through construction joint shall be made by use of inclined reinforcement.

4. In slabs on ground, so as to divide slab into areas not in excess of 1,200 square feet.

Reinforcement shall be continued across construction joints. Joints shall be perpendicular to main reinforcement.

B. Expansion joints shall be constructed and located as shown on Drawings. Reinforcing bars or other fixed metal items embedded or bonded in concrete shall not be run continuous through expansion joints.

C. Place concrete continuously between construction and expansion joints to produce a unit monolithic in construction. Allow 72 hours minimum to elapse between casting of adjoining units.

D. Install flexible polyvinylchloride (PVC) waterstops in construction and expansion joints where shown on Drawings and where water integrity is required. Support water stop during concrete placement to maintain its proper position in the joint. Make splices with thermostatically controlled electric splicer. Spliced joints shall develop effective watertightness equal to watertightness of continuous waterstop material, shall permanently develop not less than 50 percent of the parent section mechanical strength, and shall permanently retain their flexibility. Waterstops protruding from joints shall be protected from damages.

E. Form transverse contraction joints in sidewalks with tool designed to form groove 3/4 inch deep. Joint spacing shall be equal to sidewalk width. Round joint edges with 1/4 inch edger. Provide transverse 1/2 inch wide expansion joints 20 feet on center. Fill expansion joints with asphalt premolded joint filler.

3.08 BONDING

A. Bonding to New Concrete. Prior to placing new concrete on or against recently set concrete work, thoroughly clean existing surface of laitance, foreign matter, and loose particles. Place or tighten forms, dampen concrete, and slush existing surfaces with neat cement grout. Place new concrete before neat cement grout has attained its initial set. For horizontal construction joints, place a 1-1/2 inch thick layer of mortar before placing new concrete. Mortar shall be standard concrete mix without coarse aggregate and shall have a 6 inch minimum slump. Neat cement grout shall consist of one (1) part cement to two (2) parts sand and sufficient water to produce a workable mix.

B. Bonding to Old Concrete. Apply epoxy bonding compound to existing concrete surfaces , where shown on the plans, prior to placing new concrete. Epoxy bonding

compound shall be tacky at time new concrete is placed. Apply epoxy bonding compound in strict accordance with manufacturer's recommendations.

3.09 INSERTS AND APPURTENANCES

A. Set necessary anchor bolts, pipe anchors, pipe sleeves, wall pipes, conduits, inserts, and other appurtenances in forms accurately, true, plumb, and securely to prevent dislocation during concrete placement. Coat aluminum items with two coats of heavy asphalt or bitumastic paint prior to placing in concrete.

B. Conduits and pipes embedded in concrete shall comply with ACI 318, Section 6.3 and the following:

1. Beams and joints having pipes or sleeves passing through them where not shown on Drawings shall have their width increased adjacent to the sleeve or pipe or over its entire length to obtain the same cross-sectional area of concrete called for, and to provide specified cover and clearance between reinforcing bars.

2. Concrete cover over pipes or sleeves shall be not less than 1 inch.

3. Conduits or pipes shall be placed at mid-height of beams and in the center of columns.

3.10 FIELD QUALITY CONTROL

A. Secure concrete samples for testing in accordance with ASTM C172.

B. Laboratory-Cured Compression Test Specimens: Four (4) test cylinders for each concrete class placed each day shall be taken not less than once per day, nor less than once for each 100 cubic yards, nor less than once for each 5,000 square feet of surface area for slabs or walls. Additional cylinders shall be made and tested when deemed necessary by Owner. Make and laboratory-cure compression test specimens in accordance with ASTM C31. Two (2) specimens shall be tested at 28 days for acceptance and two (2) at seven (7) days for information. Compression tests shall be made in accordance with ASTM C39. Test results shall be average of two (2) specimens tested. Do not remove shoring or apply appreciable loads to any concrete structure unless strength tests have been completed and results and equal to or greater than minimum required values. When the seven- (7) day test results do not exceed the minimum requirements, saturation curing shall be used on the related structural component for the remainder of the 28-day period. Procedures for protecting and curing concrete shall be improved when test results do not exceed minimum requirements. The Engineer shall have the right to alter mix design as needed to secure defined compression strengths.

C. If one specimen in a compression test manifests evidence of improper sampling, molding, or testing, specimen shall be discarded and remaining cylinder strength shall be considered test result. If both specimens in a compression test manifest evidence of improper sampling, molding, or testing, entire test shall be discarded.

D. Where question arises as to concrete quality in the structure, Engineer shall have right to require load or core tests. Load tests shall be performed in accordance with ACI 318. Core tests shall be performed in accordance with ASTM C42. Openings resulting from core extractions shall be coated with epoxy bonding compound and filled with non-shrink grout. If tests on hardened concrete fail to meet specified strengths for class of concrete in question, Engineer has the right to order affected portion removed and replaced with concrete meeting specified requirements at Contractor's expense.

E. Air content shall be determined at the same time as the preparation of test cylinders for compression tests and when directed by Engineer to confirm required air content. Perform tests at job site in accordance with ASTM C231.

F. Mix consistency shall be controlled by slump tests at job site in accordance with ASTM C143. Slump tests shall be performed at same time as preparation of test cylinders for compression tests and when directed by Engineer to confirm required slump.

G. Contractor shall furnish necessary labor to assist testing agency in obtaining and handling samples.

3.11 MEASUREMENT AND PAYMENT

A. Separate payment will be made for roof structure footings. Include the cost of all other work in this Section in the contract LUMP SUM price.

END OF SECTION

SECTION 06005

HIGH DENSITY POLYETHYLENE LINER

SECTION 06005

HIGH DENSITY POLYETHYLENE LINER

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This section covers the delivery, installation, seaming and quality control testing requirements for placement of the 20 mil HDPE liner. Contractor shall furnish all equipment, labor, materials and expertise to supply materials and construct liner system in strict accordance with the Drawings and Specifications.

1.02 RELATED SECTIONS

A. Section 02200: Earthwork

1.03 QUALITY CONTROL

A. Contractor will be responsible for performing quality control tests during construction. Specific QC testing requirements and frequencies are listed for each type of material. Contractor shall furnish the Engineer with factory manufacturing data on properties of all materials to be installed.

B. The Contractor shall provide qualified personnel, appropriate instruments and test devices necessary to perform the QC testing required. Inspection and tests performed by the Engineer shall not relieve the Contractor of his sole responsibility for quality of all work performed by the Contractor or subcontractors.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Material will be delivered to the site and stored near the subgrade to be lined. Contractor will protect material from weathering, theft, vandalism, dirt and damage from passing vehicles.

B. Any damaged material will be documented at delivery. Manufacturers representative will ensure damaged material is appropriately tagged, documented and removed from the site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Liner

1. Flexible Membrane Liner (FML). The FML shall consist of impervious sheets of high density polyethylene (HDPE) of 20 gauge made from first quality, virgin materials, 95 percent (by weight) or more of which shall be "pipe-grade" polyethylene resin. The polymer resin shall have a maximum melt flow index of 0.23 g/10 minutes (ASTM D1238, Condition E), a carbon black content of 2 to 3 percent (ASTM D1603) and an A-2 carbon black distribution rating (ASTM D3015). The liner shall

be free of pinholes, blisters, holes and contaminants including, but not limited to non-dispersed ingredients, and shall meet or exceed the National Sanitation Foundation Standard No. 54 specifications for HDPE 20.

2. Labels on each roll shall identify the thickness of the material, the length, the width of the roll and the manufacturers name.

PART 3 EXECUTION

3.01 SUBMITTALS

A. The HDPE liner installer shall provide the Engineer with certificate of acceptance stating that the subgrade is acceptable prior to commencing work. The installer will follow all manufacturer recommended procedures for handling, deploying and seaming of the liner material. The installer shall provide a panel layout drawing depicting the location and installation sequence for each panel. Layout will be such that length of seams shall be minimized.

3.02 INSTALLATION

A. Liner shall be deployed such that no pockets of air remain under liner sheets after seaming and placement in anchor trenches.

B. Field seams shall be made using manufacturer's extrusion or fusion welding systems equipment and techniques. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures and pressures in the zone of contact where the machine is actually fusing the lining material, to ensure that changes in environmental conditions will not affect the integrity of the weld. The composition of the extrudate shall be identical to the lining material. All seams shall be formed by overlapping adjacent edges a maximum of 4 inches. The contact surfaces shall be wiped clean to remove dirt, dust, moisture, and other foreign material prior to seaming.

C. No "fish mouths" shall be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped, and an overlap fusion wedge weld or hot weld shall be applied.

D. Anchor trenches will be backfilled with suitable material and compacted to 95 percent of the maximum dry density. Material shall be placed in 8 inch loose lifts to the top of the trench. Contractor will use appropriate hand compactors working carefully not to damage the synthetic liner components.

3.03 QUALITY CONTROL

A. HDPE liner shall be visually inspected for damage. All repairs shall be performed by standard patching techniques. The patch shall be a minimum 4 inches larger in all directions before seaming.

B. All seams shall be visually inspected and nondestructively tested over their full length to ensure watertight homogeneous seams. Vacuum test units or air pressure test units shall be used. Testing shall be done as the seaming work progresses, not at the completion of all field seaming. The location, test date, unit, name of tester and outcome of all

nondestructive testing shall be documented and reports given to the Engineer. All defects detected shall be corrected by the Contractor.

C. Destructive seam testing shall be completed at a frequency of one test every 500 feet of seam length. Each test weld shall be marked with the date, ambient temperature and welding machine number. Samples of the weld will be cut and tested in the field for peel. Seams should exhibit a film tear bond. The weld sample will also be tested with laboratory tensometer equipment in accordance with applicable ASTM Standards. Seam tensile strength should exceed liner material tensile strength. All defects detected shall be corrected by the Contractor.

3.04 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 06020

GEOTEXTILE

SECTION 06020

GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

A. The Work includes the supply, delivery, and installation of nonwoven, needlepunched geotextile to be used as stabilization and filtering geosynthetics in the construction of the treatment pad system. The Contractor shall supply all equipment, tools, labor, supervision, and materials required to complete the Work in accordance with the Contract Documents.

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. The geotextile manufacturer(s) shall be specialist(s) in the manufacturing of polyester and/or polypropylene geotextile, and shall have produced and manufactured a minimum of 5 million ft^2 of said geotextiles that were used in successful installations.

B. Materials Testing

1. Test materials are as set forth in the applicable referenced Specifications and as required herein. Required testing of the geotextiles is set forth herein.

Plant Testing of Geotextiles. Geotextiles shall be tested by the manufacturer prior to shipment (to the site or drainage composite manufacturer) to ensure that the physical and mechanical properties of the finished product are in accordance with these Specifications. The required material properties, test methods, values, and units are presented in Table 06020-1. Test frequencies shall be one (1) of each test for every 85,000 ft^2 of geotextile produced, or in accordance with ASTM D4354, whichever requires more frequent testing. In addition, one (1) 70 ft^2 coupon of each geotextile for every 85,000 ft^2 of geotextile produced for this project shall be retained by the manufacturer until construction of the treatment pad system, for which the geotextile is used, is complete. These coupons shall be submitted to the Engineer upon request.

Table 06020-1

Physical and Mechanical Properties of Geotextile

Property	Test Method	Required Minimum Value[1]	Unit
Unit Weight[2]	ASTM D3776	6	oz/yd^2
Thickness	ASTM D1777-64	65	mils
Puncture Strength	ASTM D4833	80	lbs
AOS	ASTM D4751	--	sieve size (mm)
Grab Strength	ASTM D4632	150	lbs
Grab Elongation	ASTM D4632	50	%
Trapezoidal Tear Strength	ASTM D4533	60	lbs
Mullen Burst Strength	ASTM D3786	275	psi
Permittivity	ASTM D4491-85	--	sec^{-1}
UV Resistance[3] (@ 500 Hours)	ASTM D4355-84	70	% strength retained

[1]Minimum average roll values (MARV).
[2]For information only, not a required property.
[3]Manufacturer's certification required which states product exceeds required value for typical roll values.

Field Testing of Geotextile. Samples of delivered nonwoven geotextile shall be obtained in the field by the Contractor at a frequency of one sample (at least 4 ft. by 4 ft.) for every 85,000 ft^2 of material installed. At the discretion of the Engineer, each sample obtained shall be tested for grab strength at an Engineer-approved testing laboratory so as to demonstrate that the geotextile being installed is the same as that tested at the plant. The samples selected for testing shall have the location (grid coordinates), roll, lot, and manufacturer clearly marked on or attached to the sample. At least two (2) samples of each geotextile shall be collected by the Contractor from the field and submitted to the Engineer.

C. Laboratory Testing

1. Unless otherwise indicated, testing shall be performed by the manufacturer or by an Engineer-approved independent geosynthetics testing laboratory with materials furnished by the Contractor and at the expense of the Contractor.

D. Visual Inspection During Installation

1. During placement of the geotextile, the Contractor shall carry out visual inspections of the material surface. Any faulty areas relating to fabric integrity, uniformity, rips, or tears, sewing incompleteness, and seam overlap shall be repaired by the Contractor using pre-approved techniques and in accordance with manufacturer recommendations. Such repairs shall be reported to the Engineer by means of a daily QC log. At any point in the Work, if the daily QC log has not been submitted, the Engineer has the right to stop work at the expense of the Contractor until the daily QC log is submitted.

1.03 SUBMITTALS

A. Certified Test Reports

1. Certified test reports within the requirements of standards and testing methods specified herein shall be submitted to the Engineer for approval prior to material delivery. The material manufacturer and Contractor must satisfy the Engineer that the material they offer to furnish and install shall meet every aspect of the requirements listed in Table 06020-1. The Contractor shall transmit to the Engineer all information given to them by the manufacturer or supplier prior to approval for furnishing and installing any such material.

2. Within three (3) weeks after award of Contract, the Contractor shall obtain from the geotextile supplier(s) and submit to the Engineer for approval samples of the proposed geotextile materials.

B. Installation and Repair Recommendations

1. Within 3 weeks after award of the Contract, submit manufacturer's recommended installation procedures for the sewing of the geotextiles, including procedures for repair. All seaming shall be performed by trained personnel of the Contractor or their subcontractors; the geotextile installer must be certified by the geotextile manufacturer. The Contractor may also be requested to

submit training or experience records of the installer personnel to the Engineer for approval.

C. As-Built Drawings

1. The Contractor shall provide the Engineer with an as-built drawing of each installed geotextile. The as-built drawing shall indicate seam locations, panel numbers, roll numbers, and lot numbers. The as-built drawings shall also indicate the panel and roll numbers from which the coupons were taken prior to delivery and where samples were taken for field testing, as required in Subsection 1.02.B.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site only after the required submittals have been approved by the Engineer. Storage and handling of the materials shall conform to the manufacturer's recommendations and shall be done in such a manner as to prevent damage to any part of the Work. The Contractor shall provide labor and equipment to properly unload material upon arrival at the site. The material shall be stored in a reasonably level, smooth, and well-drained area that is away from sharp objects or rocks that may puncture the fabric, away from brush, poison oak or ivy, oil, grease, or fuels, and in an accessible area for inspection. Individual rolls shall be stored with safe walking space and clearance between them to allow full view for inspection purposes. To prevent ultraviolet degradation of the material, the protective wrapper on each geotextile roll shall not be removed until the material is ready for use. Any rolls that are delivered without protective wrappers shall be rejected by the Engineer at no cost to the Engineer. Any rolls of geotextile that will not be installed within 21 days following delivery to the site shall be covered with tarps to protect the ends of the rolls from the elements.

PART 2 PRODUCTS

2.01 GEOTEXTILE

A. Nonwoven, needlepunched geotextiles shall be provided to meet the minimum physical and mechanical properties outlined in Table 06020-1 and as designated on the Drawings. The properties shown represent the minimum average roll values (MARV) for the installed materials, unless otherwise indicated.

B. The required end uses for nonwoven needlepunched geotextiles to be placed are shown on the Drawings. Geotextiles shall also be used for miscellaneous soil erosion and sedimentation controls as detailed on the Drawings.

2.02 GEOTEXTILE THREAD FOR SEAMING

A. The Contractor shall submit information to the Engineer regarding the type of thread to be used for seaming of geotextiles. Thread shall be composed of a polymeric material similar to the geotextile being seamed. Thread shall be a contrasting color to that of the geotextiles for easy inspection.

PART 3 EXECUTION

3.01 INSTALLATION RESPONSIBILITY

A. The Contractor shall be responsible for installing the geotextiles and all components and details associated with these materials.

3.02 GEOTEXTILE PLACEMENT

A. Geotextiles shall be placed by the Contractor at the locations shown on the Drawings. All bedding geotextile seams shall consist of adjacent panels sewn securely together using approved thread and "prayer" seams according to the approved installation procedures. Seams on slopes shall be oriented with the slope. End-of-roll seams shall be offset a minimum of 5 ft. between adjacent roll ends. Cross-slope seams shall be avoided as much as possible. Where seaming of geotextiles is not required (e.g., access roads and drainage outlets), adjacent panels of geotextiles shall be overlapped with the upgradient panel on top. During periods of high winds, sandbags, or other methods approved by the manufacturer shall be used by the Contractor to secure any exposed geotextile in place.

B. Geotextiles that have soils placed upon them shall have 10 inches (minimum) of the material placed onto the fabric and spread in advance of high-flotation, low-ground-pressure (LGP) construction equipment. The material shall be spread in the same direction as the fabric is seamed. Extreme care shall be required by the Contractor so that the equipment operator only pushes the soil materials ahead without damage to the geotextile. At no time shall construction equipment be permitted to track directly on the geotextile. Any damage to the fabric or other final cover system geosynthetics shall be repaired by the Contractor (using approved methods) at no expense to the Engineer.

3.03 COVERING GEOTEXTILES

A. All geotextiles shall be covered within 21 calendar days following removal of their protective wrapping and their placement in the field to protect them from ultraviolet degradation. The Contractor shall stage construction activities to accomplish the schedule. Any geotextile left exposed longer than the 21 calendar days shall, at the Engineer's direction, be removed and replaced at no cost to the Engineer.

3.04 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 09900

PAINTING

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Inspection.
2. Surface Preparation.
3. Protection.
4. Application.
5. Finishing Electrical and Mechanical Equipment.
6. Cleaning.
7. Schedule - Exterior Surfaces.
8. Schedule - Interior Surfaces.
9. Schedule - Colors.

B. Related Sections

1. Section 16010: Basic Electrical Requirements

1.02 REFERENCES

ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

1.03 DEFINITIONS

A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.04 QUALITY ASSURANCE/QUALITY CONTROL

A. Product Manufacturer. Company specializing in manufacturing quality paint and finish products with three years experience.

B. Applicator. Company specializing in commercial painting and finishing with five years documented experience.

C. The Contractor shall request review of first finished space or item of each color scheme required by the Engineer for color, texture, and workmanship.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable codes for flame/fuel/smoke rating requirements for finishes.

1.06 TESTS

A. Provide analysis and testing of paint as requested by the Engineer.

1.07 SUBMITTALS

A. Submit product data and color samples from which final colors shall be selected by the Engineer.

B. Provide product data on all finishing products.

C. The Contractor shall furnish test samples of materials when required by the Engineer.

D. Submit manufacturer's application instructions.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of this Section.

B. Store and protect products in an area approved by the Engineer.

C. Deliver products to site in sealed and labelled containers; inspect to verify acceptance.

D. Container labelling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

E. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.

F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F (7 degrees C) for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.

1.10 EXTRA STOCK

A. Provide a one gallon (4 L) container of each color and surface texture to the Engineer.

B. Label each container with color, texture, and locations, in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coatings. Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.

B. Coatings. Good flow and brushing properties; capable of drying or curing free of streaks or sags.

C. Accessory Materials. Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.02 FINISHES

A. Refer to schedule at end of Section for surface finish and color schedule.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Beginning of installation means acceptance of existing surfaces.

3.02 PREPARATION

A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

B. Correct minor defects and clean surfaces which affect work of this Section.

C. Shellac and seal marks which may bleed through surface finishes.

D. Impervious Surfaces. Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Aluminum Surfaces Scheduled for Paint Finish. Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish. Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.

G. Insulated Coverings. Remove dirt, grease, and oil from canvas and cotton.

H. Concrete Floors. Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

I. Copper Surfaces Scheduled for a Paint Finish. Remove contamination by steam, high pressure water, or solvent washing. Apply vinyl etch primer immediately following cleaning.

J. Copper Surfaces Scheduled for a Natural Oxidized Finish. Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid. Rub on repeatedly for required effect. Once attained, rinse surfaces with clear water and allow to dry.

K. Gypsum Board Surfaces. Latex fill minor defects. Spot prime defects after repair.

L. Galvanized Surfaces. Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

N. Plaster Surfaces. Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

O. Uncoated Steel and Iron Surfaces. Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

P. Shop Primed Steel Surfaces. Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

Q. Interior Wood Items Scheduled to Receive Finish. Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

R. Exterior Wood Scheduled to Receive Paint Finish. Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

S. Glue-Laminated Beams. Prior to finishing, wash surfaces with solvent, remove grease and dirt.

T. Wood and Metal Doors Scheduled for Painting. Seal top and bottom edges with primer.

3.03 PROTECTION

A. Protect elements surrounding the work of this section from damage or disfiguration.

B. Repair damage to other surfaces caused by work of this section.

C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.

D. Remove empty paint containers from site.

3.04 APPLICATION

A. Apply products in accordance with manufacturer's instructions.
B. Do not apply finishes to surfaces that are not dry.
C. Apply each coat to uniform finish.
D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
E. Sand lightly between coats to achieve required finish.
F. Allow applied coat to dry before next coat is applied.

3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.

C. Replace identification markings on mechanical or electrical equipment when painted accidentally.

D. Paint exposed conduit and electrical equipment occurring in finished areas.

E. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

F. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.06 CLEANING

A. As work proceeds, promptly remove paint where spilled, splashed, or spattered.

B. During progress of work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.07 SCHEDULE - EXTERIOR SURFACES

A. Steel - Shop Primed

1. Touch-up with zinc chromate primer.
2. Two coats alkyd enamel.

B. Steel - Galvanized

1. One coat zinc chromate primer.
2. Two coats alkyd enamel.

C. Aluminum - Mill Finish

1. One coat etching primer.
2. Two coats alkyd enamel.

3.08 SCHEDULE - COLORS

A. As approved by the Engineer.

3.09 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 11212

SUBMERSIBLE SUMP PUMP

SECTION 11212

SUBMERSIBLE SUMP PUMP

PART 1 GENERAL

1.01 SUMMARY

A. Furnish a submersible sump pump system as described in this Section and as shown on the Drawings. System shall be complete with pump, control panel, floating switches, all interconnecting cable, and all other accessories to make a complete automatic system.

1.02 RELATED WORK

A. Division 15: Mechanical
B. Division 16: Electrical

PART 2 PRODUCTS

2.01 SUMP PUMP SCHEDULE

A. Runoff Pumping Station

1.	Number of Pump(s):	2 (one space not installed)
2.	Capacity:	50 gpm @ 20 ft. total dynamic head
3.	Maximum Motor Rating:	1 HP
4.	Maximum Discharge Size:	1-1/2"
5.	Power:	120V, 1-phase
6.	Discharge Check Valve:	Provide check valve of suitable design and materials on pump discharge line
7.	Manufacturer:	Myers, Model WHV-5 or equal

2.02 MOTOR

A. Submersible motor to be constructed with open windings and to operate in clean, dry dielectric oil for cooling windings and lubricating motor bearings. Motor shaft to be sealed with mechanical shaft seal, having super lapped seal rings of carbon and ceramic. Integral motor and pump shaft to be of stainless steel, supported with stainless steel anchor bolts installed during the pouring of the base to form a monolithic union.

2.03 MATERIAL

A. Pump and motor housing shall be of cast iron. Impeller shall be cast iron, of the non-clog type, passing 1-inch solids. All fasteners shall be stainless steel.

2.04 ELECTRICAL CONTROLS

A. The pump installation shall be fully enclosed in a NEMA 3R enclosure. The enclosure shall house a combination motor circuit protector, HOA switch, and red run light. The

panel shall be equipped with a red alarm light to indicate a high level alarm, an alarm annunciator, a manual alarm reset button, and a light test button.

B. Mercury switch type level controls shall be used to control the sump level and to activate the high level alarm. To control the automatic operation of the pumps a total of three mercury switch level controls (pump on, pump off, and high level alarm) shall be provided at selected levels. Levels to be set at the direction of the Engineer. All controls shall be fastened to piping.

C. The control panel shall be mounted adjacent to the sump on a 4-inch galvanized steel channel frame. This frame shall be secured in the ground to a reinforced concrete pad. The control panel shall include a grounded 120V receptacle.

PART 3 EXECUTION

3.01 INSTALLATION

A. Conform to Manufacturer's Instructions.
B. Train Owner's operators in use of pump and controller.
C. Provide three copies of Manufacturer's Operation and Maintenance Manual.

3.02 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 13709

ROOF STRUCTURE

SECTION 13709

ROOF STRUCTURE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. System Description.
2. Design Requirements.
3. Submittals.
4. Quality Assurance.
5. Qualifications.
6. Regulatory Requirements.
7. Field Measurements.
8. Warranty.

B. Related Sections

1. Section 03301: Concrete ditch
2. Section 09900: Painting

C. This specification has been included for information only. The Engineer shall purchase and deliver the roof structure as described herein to the project site. The Contractor is responsible for unloading and erection. Coordinate timing of unloading with the Engineer.

D. Size: One-story 120 feet wide by 100 feet/80 feet long by 21-foot eave height as shown on the Drawing.

1. The building shall include all primary and secondary structural framing members, connection bolts, covering, translucent fiberglass panels, flashing closures, sealer, and other miscellaneous items as called for on the contract and required for a complete installation.

2. The building manufacturer shall provide installation and assembly drawings including anchor bolt setting plan, roof plan, elevation, cross section, etc., as required to assemble all parts, components and accessories furnished by the building manufacturer. Drawings shall indicate the piece marks of all parts to be erected or assembled for easy field identification.

1.02 REFERENCES

AISC - Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

ASTM A36 - Structural Steel.

ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.

ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

ASTM A325 - High Strength Bolts for Structural Steel Joints.

ASTM A386 - Zinc-coating (Hot-Dip) on Assembled Steel Products.

ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

ASTM A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.

ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

ASTM A501 - Hot Formed Welded and Seamless Carbon Steel Structural Tubing.

ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.

ASTM A529 - Structural Steel with 42,000 psi (290 MPa) Minimum Yield Point.

ASTM A572 - High Strength Low Alloy Columbium-Vanadium Steel of Structural Quality.

ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

AWS A2.0 - Standard Welding Symbols.

AWS D1.1 - Structural Welding Code.

FS HH-I-521 - Insulation Blankets, Thermal, Mineral Fiber.

FS HH-I-558 - Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type).

SSPC - Steel Structures Painting Council.

1.03 DRAWINGS AND CERTIFICATION

A. The building manufacturer will furnish complete erection drawings showing anchor bolt settings, sidewall, endwall, and roof framing, transverse cross-sections, covering and flashing details, and accessory installation details to clearly indicate the proper assembly of all building parts.

B. The building manufacturer shall also furnish a certificate signed by a Registered Professional Engineer (P.E.), registered in the State of Ohio, that the building design meets the requirements of the specifications and the most recent edition of the Uniform Building Code, and is in accordance with generally accepted engineering practices.

PART 2 PRODUCTS

2.01 DESIGN

A. Type. One-story single slope rigid frame construction with center column with 5 - 20 foot bays. Note: The three main frame columns will be of different lengths, as shown on the Drawing.

1. All structural mill sections and welded plate members shall be designed in accordance with the AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings."

2. All cold-formed structural members shall be designed in accordance with the AISI "Specification for the Design of Cold-Formed Steel Structural Members."

3. Design load requirements shall be determined by local conditions, applicable codes, building end-use, etc., and design shall be in accordance with the "Recommended Design Practices Manual" of the Metal Building Manufacturers Association. At a minimum, design loads shall include the following:

   a. Dead Load: Weight of all structural members plus flooring and roof.

   b. Superimposed Dead Load: 5 psf on roof for electrical, plumbing, and HVAC loads.

   c. Wind Load: Per Uniform Building Code, latest edition (but not less than 100 mph).

   d. Roof Live Load: 30 psf (minimum).

4. Building layout as shown on the Drawings.

2.02 GENERAL FABRICATION

A. All structural steel members shall be factory cut, formed, punched, welded, and prime-coat painted for bolted field assembly. All base plates, cap plates, stiffener plates, and splice plates shall be shop fabricated complete with bolt connection holes. All building parts shall carry an identifying piece mark for easy field identification.

All welding shall be done in accordance with the American Welding Society Code for Building Construction.

1. Flanges and webs of built-up welded members shall be joined by a continuous automatic submerged arc-welding process on one side of the web.
2. Certification of welder qualification shall be supplied when required or specified. Operators shall be qualified as prescribed in the "Standard Procedure of the American Welding Society."

2.03 PRIMARY STRUCTURAL MEMBERS

A. Steel used in the fabrication of built-up primary structural members shall have a minimum yield of 50,000 psi. Hot-rolled primary structural members shall have a minimum yield of 36,000 psi. Steel with a minimum yield different from the above may be used as required by design or as specified.

B. Primary framing shall be shop fabricated and shall include factory-welded purlin and girt clips. Holes shall be provided by the factory for attachment of secondary members and bracing.

C. Bearing endwall frames shall consist of endwall columns, corner columns and roof beams as required by design criteria.

2.04 SECONDARY STRUCTURAL MEMBERS

A. Steel used in the fabrication of cold-formed structural members shall have a minimum yield of 55,000 psi. Steel with a minimum yield different from the above may be used on individual members as required by design or as specified.

B. Purlins and Girts. Purlins and girts shall bolt to clips which are factory-welded to the frames. Purlins and girts shall be precision roll-formed of 16-, 14-, or 12-gauge steel with a minimum yield of 55,000 psi. Purlins and girts shall be 8-inch deep "Z" sections with 2.5- or 3.5-wide flanges with stiffening lips formed at any angle of 45 degrees with the flanges.

C. Eave Struts. Eave struts shall be "C" sections with one flange cold-formed to suit the roof slope and vertical wall condition and provide suitable fastening surfaces for both wall and roof sheets. Steel in eave struts shall be 14-gauge minimum yield of 55,000 psi.

D. Wind Bracing. Buildings shall be designed to resist loads by diagonal bracing consisting of either cables, rods or angles; diaphragm action of the wall panels and girts/structural bents or a combination of these methods. Diagonal bracing shall not interfere with the two (2) construction entrances on the south wall of the structure as shown on the Drawings.

E. Flange Bracing. The inside flange of all frames shall be adequately braced so that the allowable compressive stress is adequate for the design load combination.

F. Base Member. A continuous base member shall be provided to which the base of the wall covering may be attached. This base member shall have an elevation of 8 feet below the same height.

G. Openings. Framing members for all openings shall be adequate for the imposed loads.

2.05 STRUCTURAL COATING

A. All structural steel components are to be coated in accordance with Section 09900: Painting.

2.06 SPLICES AND CONNECTIONS

A. All structural steel shall be shop punched for bolted field assembly, except for field-located accessories.

B. All bolts for field assembly of primary structural members shall be high strength bolts, finish will be electro-zinc with bronze chemical chromate conversion coating. All high strength bolts shall conform to ASTM A-325, unless otherwise specified. Bolts for primary structural members shall not be less than 5/8-inch diameter. Bolts for secondary members shall be 1/2-inch electro-zinc plated machine bolts confirming to ASTM A-307 unless otherwise specified.

2.07 ROOF PITCH

A. Ratio of 1/2 / 12.

2.08 LOADINGS

A. Standard BOCA, latest edition.

2.09 ROOFING

A. 26-gauge preformed panels with a minimum 1.25-inch major rib corrugations spaced on a maximum 18-inch center, fastened with long life fasteners.

1. General. Panels shall be 24-gauge aluminum-zinc alloy (other types of panel material are available upon special request) wall panels. Material for roof panels shall confirm to ASTM A-446, Grade E (80,000 psi minimum yield strength). Material for roof panels and wall panels shall conform to ASTM A-525, Designation G-90, 50 KSI minimum yield strength.

2. Translucent Fiberglass Panels. As specified under Siding, translucent fiberglass panels shall be used in the roofing as shown on the Drawing.

3. Panel Description

   a. Panels shall be precision roll-formed for 3' - 0" wide coverage and shall have major ribs on maximum 18-inch centers, minimum 1.25-inch high and minor ribs centered between major ribs.

      1. Roof panels shall have purlin-bearing leg at one edge of the panel to provide support and a tight fit at the panel sidelap.
      2. Roof panels shall be rated by Underwriters Laboratory (U.L.) for class 90 wind uplift.

4. Concealed Back-Up Bar. A cold-formed 16-gauge preformed plate with interlocking tabs to engage factory-punched stirrups on the panel. The back-up bar shall be prepunched to align with factory-punched holes in the panel endlap, and shall be self-aligning and self-supporting, and not attached to any structural member, thus providing unrestricted thermal movement of panels.

5. Endlap Cinch Strap. An aluminum alloy device, self-aligning and pre-punched to align with pre-punched holes in the panel endlap and back-up bar. The cinch strap shall be stamped with stiffener grooves.

6. End Dams. 18-gauge cold-formed member to provide a water-tight seal at the ridge and to support and seal the ridge roll.

2.10 SIDING

A. Translucent fiberglass panels from the eave strut to 8 feet below the eave strut. The siding is to be continuous around the perimeter of the building [fastened with long life fasteners]. All four sides are open to a minimum of 14 feet, measured from ground surface.

1. Glass fiber reinforced polyester panels confirming to Commercial Standards CS-214-57 shall be:

   Type 1 - General Purpose
   Type 2 - UL-Approved Fire Retardant

2. Fiberglass panels shall have a profile matching the roof panels and shall be .060-inch thick weighing 8 ounces per square foot, depending on job requirements.

SECTION 15001

GENERAL REQUIREMENTS FOR PIPING SYSTEMS

3. Skylites are qualified by Underwriters Laboratory (U.L.) class 90 wind uplift rated with the addition of appropriate trim kit.

2.11 SEALANT

A. Roof panel side and endlaps shall be sealed with Butyl sealant which is 100 percent nonvolatile to eliminate hardening and cracking. Sealant shall be furnished in paper-separated rolls and shall be 1/2-inch wide by 3/32-inch thick; except in areas where extreme snow and ice conditions occur, sealant 1-inch wide by 3/32-inch thick may be specified.

B. Sidelap sealant shall be factory-applied closed-cell foam tape. Sealant used at endlaps, rake and eave shall be 1-inch wide by 3/32-inch thick paper-backed Butyl tape sealant.

2.12 FASTENERS

A. Roof and wall panels shall be fastened to the purlins, girts, eave struts and other structural members with No. 14 Type "A" self-tapping fasteners or No. 12 self-drilling fasteners with neoprene washers for permanent seal. Electro-zinc plated colored fasteners are to be used on colored walls.

B. Standing seam roof panels shall be attached to structural members with No. 14 self-drilling fasteners for clips and No. 17 self-tapping fasteners with neoprene weather-sealed washers for endlaps and panel terminations.

C. Fastener spacing shall be as called for on erection drawings.

2.13 FLASHING AND TRIM

A. Flashing and/or trim shall be furnished at the rake, corners and eaves, at framed openings, and wherever necessary to provide weather tightness and a finished appearance.

B. Galvanized or colored steel for flashing, metal closures, trim and other miscellaneous uses shall conform to ASTM A-446, Grade D (50,000 psi), Designation G-90. Base trim shall confirm to Grade B (37,000 psi), an Type II roll-formed trim shall confirm to Grade C (40,000 psi).

2.14 INSULATION

A. None

2.15 GUTTERS AND DOWNSPOUTS

A. Furnished to the existing ground elevation with splash plates, 3 feet minimum length, below base plate elevation.

2.16 EAVE GUTTERS AND DOWNSPOUTS

A. Eave gutters shall be roll-formed to a true profile, free of objectionable waviness and any other imperfections, from 24 gauge factory painted aluminum. The face of the gutter shall match the profile of the rake trim. All gutter sections shall be securely fastened and sealed at end laps. The outside face of the gutter shall be supported by 22 gauge factory painted aluminum supports on 3'-0" centers.

B. Downspout shall be 4" x 4" roll-formed box sections made from 24 gauge factory paned aluminum. Matching finish 24 gauge aluminum straps shall be provided for securing downspouts to the building wall. Kickouts (not elbow type) shall be provided on each downspout.

2.17 WALK DOORS

A. None.

2.18 OPENINGS

A. Two (2) at south endwall, 12 feet wide by 14 feet high.

2.19 ANCHOR BOLT

A. To be provided, in wood templates, to be placed by the contractor.

2.20 LIGHTING PROTECTION/GROUNDING

A. The building shall provide interior protection from lighting and shall be adequately grounded in accordance with the National Electric Code, latest edition, Article 250.

PART 3 EXECUTION

3.01 DELIVERY

A. Delivery of Roof Structure to be coordinated with the Engineer.

3.02 SUPERVISION

A. Provide the services of one factory-trained supervisor to assist the Engineer during erection of the building. The supervisor shall be onsite during the entire erection process. Timing shall be coordinated with the Engineer.

1. Supervisor shall be U.S. Citizen.
2. Supervisor shall attend the 20 minute EG&G Mound Orientation Training prior to working at the site.
3. Supervisor shall read and sign-off on WESTON's site specific Health and Safety Plan.

3.03 PAYMENT SCHEDULE

A. No separate payment will be made for Work performed under this section. Indicate the cost of erection of the roof structure and all appurtenances in the contract LUMP SUM price.

END OF SECTION

SECTION 15001

GENERAL REQUIREMENTS FOR PIPING SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. All exposed, submerged and buried piping.
B. Water piping, drainage piping.

1.02 RELATED WORK

A. Section 02200: Earthwork
B. Section 02225: Trenching

1.03 DESCRIPTION OF PIPING SYSTEMS

A. The configuration and layout of piping systems shown in the Drawings are diagrammatic and, unless specifically dimensioned, are intended to show only the general arrangement of equipment and accessories, and the general routing of piping. The Drawings do not specifically show every fitting, offset, contour, etc. required to accomplish the intended work or to avoid every interference that may be encountered. It shall be the responsibility of the Contractor to arrange all work to fit within the allowed space without modifying any building structure or property, and to make readily accessible all equipment and accessories requiring servicing or maintenance.

B. Should any changes be deemed necessary by the Contractor in items shown on the Drawings, shop drawings, descriptions and the reason for the proposed changes shall be submitted to the Engineer for approval.

C. Exceptions and inconsistencies in Drawings and Specifications shall be brought to the Engineer's attention before Bids are submitted.

D. The type of pipe and joints to be used for each system is specified in the Piping Schedule at the end of this Section.

1.04 SHOP INSPECTION AND TESTING

A. The quality of all materials, the process of manufacturer and finished piping shall be subject to inspection and approval of the Engineer.

B. Pipe may be inspected at the place of manufacture, and on the work site, and shall be subject to rejection, if defective, at any time even though submitted samples may have been approved.

C. The Engineer may have pipe or fittings inspected or tested, or both, by an independent inspection service at either the manufacturer's plant or elsewhere. Such inspections and/or test will be at the Engineer's expense.

1.05 SUBMITTALS

A. Shop Drawings and Product Data

1. Comply with the provisions of Section 01340 and the supplemental requirements below.

2. Submit detailed layout drawings for all piping systems. Those drawings may be organized by system or by areas. Prepare drawings to scale and show the following information on them:

   a. Type of piping including material, weight, linings, and coatings. If desired, use code and key to product data sheet specified below.
   b. Location and type of joints, fittings, taps, supports, kickers and blocking.

3. Submit fabrication drawings for specials including fabricated fittings, wall pipes and wall sleeves. Show dimensions and materials of construction.

4. Submit manufacturer's standard drawings showing dimensions, configuration and materials of construction for the following items:

   a. Joints
   b. Flanges
   c. Couplings
   d. Expansion joints
   e. Hangers, brackets and other similar accessories.

5. Submit the following product data on all piping materials.

   a. Reference standard
   b. Type material
   c. Wall thickness, schedule or class as appropriate
   d. Outside diameter
   e. Type of lining
   f. Type of coating
   g. Pressure rating, if applicable.

B. Affidavits of Compliance

1. Submit affidavits of compliance with the reference standards.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling

1. Do not deliver piping materials to work site prior to Engineer's approval of required submittals.
2. Unload and handle piping materials using proper materials handling equipment.
3. Do not drop, roll, or skid piping materials.
4. Take such additional precautions as necessary to avoid damaging piping materials and coatings thereon.

B. Storage

1. Store piping materials in a manner which will reduce risk of damage.
2. Block piping materials to prevent rolling.

1.07 WORK AFFECTING EXISTING LINES

A. Notify Engineer at least five working days prior to taking existing lines out of service to make connections or for other reasons.

B. Do not take existing lines out of service without written authorization.

1.08 WARRANTY

A. Material and workmanship of equipment described in this Section shall be warranted for 1 year from date of issuance of certificate of final payment to be free of defects in design or manufacture other than normal wear and tear.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install all piping systems in accordance with the Drawings and Specifications and approved shop drawings and manufacturer's installation instructions.

B. Examine all piping materials prior to installation and replace items that are damaged or otherwise defective.

C. Thoroughly clean inside of all piping, valves, and accessories, and outside of all materials which will be exposed. Clean before installation and maintain that condition until accepted by Engineer.

D. Provide temporary caps or plugs over all pipe openings at the end of each day to prevent foreign material from entering the piping systems. The foregoing requirement may be waived at the discretion of the Engineer for large diameter exposed piping when

conditions are such that foreign material will not be inadvertently or maliciously placed in the pipe.

E. Do not modify structures, equipment, or piping for the purpose of installing piping unless specifically authorized in writing by the Engineer.

3.02 INSTALLATION OF BURIED PIPING SYSTEMS

A. Line and Grade

1. Install piping to lines and grades shown on Drawings.
2. Install pressure piping at centerline elevations if shown.
3. If centerline and/or flowline elevations are not shown on Drawings, install piping so that there is at least four feet of cover over same.

B. Dewatering

1. Keep trenches free of water when performing any type of work in them.
2. Discharge water from construction pumps or dewatering wells as directed by the Engineer.

C. Bedding

1. Bedding material shall conform to the requirements of Section 02200.

D. Laying of Pipe

1. Do not drop or roll pipe into trench. Place carefully by hand or materials handling equipment.
2. Do not lay pipe in water.
3. Join pipe as specified in piping material specifications.
4. Do not deflect pipe unless shown on Drawings or approved by Engineer.
5. When deflection of pipe is authorized, do not exceed 50 percent of pipe manufacturer's recommended maximum deflection.

E. Encasement of Piping and Valves

1. Provide sand encasement when called for on Drawings or ordered by Engineer.
2. Sand encasement to extend at least six inches from pipe in all directions.
3. Use Class C concrete when concrete encasement is called for on Drawings. Such encasement to extend at least six inches from pipe in all directions unless otherwise noted on Drawings.

F. Concrete Blocking

1. Provide concrete thrust blocking for all buried piping under pressure.
2. Locate thrust blocks at all bends, tees, and plugs.
3. Use Class C concrete.
4. Place concrete against undisturbed firm earth.
5. Area of concrete in contact with earth to be required to withstand specified field test pressure.

G. Restrained joints

1. Use restrained joint piping and fittings when called for on Drawings.
2. Restrained joints may be used in lieu of concrete blocking if type of restraining system and number of restrained joints are approved by Engineer.

H. Backfilling

1. Comply with Section 02223 and the following supplemental requirements.

2. Backfill as soon as practical after installation and testing of piping, valves, encasement, and blocking.

3. Touch up damaged protective coatings prior to backfilling.

4. Exercise care to avoid damaging piping or protective coatings with tamping equipment.

5. When authorized by the Engineer, leave sheeting and bracing in trench. Cut off all members so that tops of same are at least 18 inches below ground.

I. Making Connections to Existing Lines

1. Verify location of existing line.
2. After exposing existing line, determine fittings and adapters required to make connection and have same delivered to job site before taking existing line out of service.

3.03 INSTALLATION OF EXPOSED PIPING SYSTEMS

A. Alignment and Elevation

1. Install straight runs true to line and elevation.

2. Install vertical pipe truly plumb in all directions.

3. Install piping parallel or perpendicular to columns. Piping at odd angles and 45 degree runs across corners will not be accepted unless specifically shown on Drawings.

4. Bring piping to alignment and elevation without forcing or springing pipe.

B. Joints

1. Join pipe in accordance with specifications for piping material and the supplemental requirements below.

2. Bring piping to proper alignment and elevation with permanent support system before tightening flange bolts and nuts.

C. Unions for Piping

1. Install unions near valves and equipment to facilitate assembly and disassembly of piping.

2. Install dielectric unions wherever dissimilar metals are joined.

D. Expansion joints

1. Install in accordance with Specifications for expansion joints and approved shop drawings.

2. Use of additional couplings and adapters to be approved by Engineer prior to installation.

E. Flexible Couplings and Flanged Coupling Adapters

1. Install in accordance with Specifications for couplings and adapters, and approved shop drawings.

2. Contractor may use couplings and adapters over and above those shown on Drawings to facilitate installation of piping. Use of additional couplings and adapters must be approved by Engineer prior to installation.

F. Piping Supports and Restraints

1. General

a. Restrain, block, brace, support, or suspend pipe and fittings as required and as specified herein to prevent displacement, vibration, sagging, warping, deformation, or failure of piping and fittings, and to allow for expansion and contraction.

b. Support and restrain piping so that no piping loads will be imparted to pumps or other equipment.

G. Supports for Horizontal Piping

1. Space supports and hangers for piping no farther apart than the distances shown below.

Pipe Size (in.)	Spacing (ft.)
1/8 & 1/4	2
1/2 & 3/4	4
1 through 3	6
4 and above	10

2. Space supports and hangers for plastic piping in accordance with specifications for said piping.

3. Locate hangers or supports immediately adjacent to any change in piping direction, and on both sides of valves, couplings, and heavy fittings.

4. Install all hangers and supports so as not to interfere with the free expansion and contraction of the pipe.

5. When hangers are used to support insulated piping, provide shields to protect insulation.

6. Provide concrete supports to comply with these specifications.

H. Supports for Vertical Piping

1. Support in accordance with approved shop drawings.
2. For piping 4 inches and smaller, install riser clamps to support piping at each floor sleeve.

I. Piping Restraints

1. Provide kickers and thrust blocking where required.
2. Use Class A concrete for thrust blocks.

3.04 PIPING SCHEDULE

A. Buried and Exposed Potable Water Lines

1. Type of Pipe: Galvanized Steel
2. Weight: Standard
3. Type of Joint: Threaded Couplings
4. Specification ASTM A53-78

B. Treatment Pad Drain Pipe

1. Type of Pipe: Perforated PVC
2. Pressure Class: Schedule 80
3. Type of Joint: Solvent Weld or Couplings with Twin Gaskets

C. Buried Collection Pipe

1. Type of Pipe: PVC
2. Pressure Class: Schedule 80
3. Type of Joint: Solvent weld or couplings with twin gaskets

3.05 FINAL INSPECTION

A. Each section of buried piping will be inspected by the Engineer prior to backfilling and final pressure testing.

B. Correct, repair or replace any pipe which is not true to both line and grade and free of projections and debris.

3.06 FIELD TESTING

A. Repair or replace and retest any piping which does not conform to the test requirements.

B. Correct and retest until all piping conforms to test requirements.

C. Before pressure testing, remove or isolate all equipment that could be damaged by the test pressure or test medium from the pipe being tested.

D. Backfill buried pressure piping to a minimum depth of two feet above the top of the pipe before final testing. Temporarily brace piping to prevent damage or movement during testing. The Contractor may perform preliminary tests at his own expense prior to backfilling if desired.

E. Test pressure piping hydrostatically in accord with AWWA C600 at 1.5 times the maximum operating pressure or the pump shut-off pressure, whichever is greater, but in no case exceeding the allowable working pressure of the piping materials. The operating pressures shall be defined by the Engineer.

F. Test gravity drain lines with no less than five feet of static head and according to AWWA standard practice.

G. Pipe installation will not be accepted until the leakage for the section of line tested is less than the rate of leakage specified below:

1. Flanged, welded, screwed and soldered: No measurable leakage.
2. Push-on, mechanical joints or caulked bell and spigot piping: in accordance with AWWA C600.

H. Locate and repair the defective joints and/or pipe until the leakage is within the specified allowance, at no cost to Engineer.

3.07 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Definition. The Work included in Division 16 shall consist of furnishing all supervision, labor, materials, tools, equipment, transportation, and storage facilities required to receive, unload, handle, store, protect, clean, inspect, transport, install, assemble, level, align, connect, grout, adjust, test, reinspect, test- operate prior to start-up, and assist in start-up operations, of all Electrical Work shown on the Contract Drawings and/or as specified herein.

2. Work Scope. The work shall include (but shall not be limited to) the following major areas:

   a. Tie-ins to existing Mound utilities.
   b. Installation of special equipment.
   c. Demolition of existing electrical systems.
   d. Tests and demonstrations.

3. Permits. NOTE: "Penetration Permits" are required for any penetration in walls, ceilings, floors, sidewalks, roadways, or underground. Arrangements shall be made through the Engineer who will contact the Mound Construction Inspector responsible for the project, who also shall be responsible for appropriate scanning equipment, scanning services, and issuance of the Permit.

4. Sequence and Labeling. The Contractor shall connect all electrical equipment and wiring in the following sequence: Load first, then source. Under no circumstances shall the source be connected if a load does not exist. All wires not connected to a load at the end of a job shall be installed in a suitable junction box and the wire ends shall be protected for the design voltage of the wires. The box and wires at both ends shall be labeled with information on the intended load, the source panel, the source circuit breaker, voltage, date, and installer's name and company.

B. Related Sections

1. Section 01500: Temporary Facilities, Utilities, and Controls
2. Section 01700: Demobilization and Project Closeout

1.02 REFERENCES

ANSI/NFPA 70 - National Electrical Code.

IEEE - Institute of Electrical and Electronic Engineers.

NEMA - National Electrical Manufacturer's Association.

IES - Illuminating Engineering Society.

IPCEA - Insulated Power Cables Engineers' Association.

UL - Underwriters' Laboratories.

NEC - National Electrical Code

Mound Electrical Safety Manual, MD-10395, Issue 1, (included at end of section).

1.03 DEFINITIONS

A. Provide - to purchase, furnish, install, test and make fully operational.

B. Furnish - to purchase, and deliver to job site in original shipping container from manufacturer including all packing slips and invoices.

C. Install - to mount, connect, test, and make fully operational.

D. Relocate - to remove, save and store properly and install at a later time in a new location as indicated on Drawings.

E. Remove - to disconnect, and demount for salvage or future installation.

F. Electrical Tie-in - to make a proper electrical connection to an existing system for the purpose of extending that system.

G. Demolish - to remove, disassemble, and dispose of in a manner acceptable to the Engineer.

1.04 SYSTEM DESCRIPTION

A. Performance Requirements: Contract Drawings and Specifications. The Contract Drawings are an outline to indicate the approximate location and arrangement of conduit, wiring and equipment. Do not scale Contract Drawings, but check measurements at site and adjust work to fit space allotted. The Contract Drawings and Specifications are intended to depict the general intent of the work in scope, layout, and quality of workmanship and are not intended to show or describe in minute detail all trades and accessories necessary for the proper and complete execution of the Work.

1.05 SAFETY

A. The Mound Electrical Safety Manual has been included as an attachment to this Specification and discusses specifics of:

- General work practice requirements,
- Electrical authority having jurisdiction,
- Definition of qualified persons,
- Use of electrical equipment, and
- Personal and other types of protective equipment.

1.06 QUALITY ASSURANCE

A. Qualifications

Installation of equipment shall be performed by qualified personnel of a firm regularly engaged in such installation for at least five years.

B. Regulatory Requirements. The latest published edition of the following shall apply:

1. All electrical work shall be in accordance with the requirements of the most current National Electrical Code (NEC) except where specifically otherwise noted on the Drawings and in the Specifications.

2. All overhead line work shall be in accordance with the requirements of the NEC except where specifically otherwise noted on the Drawings and in the Specifications.

3. All electrical equipment and materials furnished and installed shall bear the Underwriters' Laboratories (UL) Label of Approval for the particular service fitted.

4. All electrical work shall be performed in accordance with applicable sections of the Mound Electrical Safety Manual MD-10395, Issue 1.

5. All control panels, and any other equipment that is not available UL listed, shall meet the Joint Industry Council Electrical Standards for General Purpose Machine Tools where applicable. Engineer's prior approval shall be required when supplying any equipment not UL listed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling. Store all materials on site in enclosures or under protective covering to keep them clean and dry. Do not store materials directly on the ground. Care shall be taken in handling so as not to damage materials. The use of damaged materials will not be permitted.

1.08 PROJECT/SITE CONDITIONS

A. Job Conditions. The Contractor shall be responsible for coordinating the work with other crafts to minimize interferences. The Contractor shall not cut, drill, or burn

structural steel or equipment in any manner except where permission is granted by the Engineer.

B. Set electrical items in a manner to clear overhead doors, ductwork, piping, and other miscellaneous equipment. Maintain symmetry of all units as closely as possible within the architectural section contained.

1.09 WARRANTY

A. The Contractor shall warranty all items in this contract, both materials and labor for a period of one year from the time of acceptance by the Engineer.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 INSTALLATION

A. Examination

1. Conditions. The Contractor shall visit the site and verify all of the existing conditions for himself. If any discrepancy exists between the existing conditions and the Contract Drawings, this shall be brought to the Engineer's attention, and the Contractor's Bid should be adjusted accordingly. No allowances shall be made for changes in the contract price for existing conditions once a contract has been signed.

2. Compliance. The Contractor shall include in the Bid, the cost to make any alterations and offsets of conduit, boxes, wireway, duct, hangers, etc., and of equipment as necessary to avoid installation conflicts with others.

3.02 PREPARATION

A. Protection

1. The Contractor shall make delivery of material and equipment to construction site only after prior arrangement for storage and protection have been made. In addition to the provisions and stipulations of Division 1, the Contractor shall provide various types of protection as follows:

- Protect finished floors from chips and cutting oil by the use of metal chip receiving pan and an oil proof floor cover.

- Protect equipment and finished surfaces from welding and cutting splatters with baffles and spatter blankets.

2. All motorized equipment, switches, controllers, control cabinets, light fixtures and rotating equipment shall be covered with canvas or heavy plastic securely

held in place to exclude dust and moisture. All stock piled pipe shall be placed on pallets and protected from weather and from entry of foreign material.

3. The Contractor shall protect factory finishes on equipment until further acceptance by Engineer and secure necessary covers and padding to provide maximum protection against all weather elements, plastering, painting and other types of damage. The Contractor shall touch up finished or prime painted surfaces as required by the Engineer at completion of job.

3.03 DEMOLITION

A. Demolish all wires, cables and conduit as indicated on the Contract Drawings or specified herein. All wires, cables and conduits to be demolished shall be removed back to the source of power for the circuit involved. Under no circumstances shall unused conductors be left in an exposed, unprotected condition. Conduit to be reused may remain in place but all wires and cables to be demolished shall be removed back to source.

3.04 INSTALLATION

A. General. All materials installed shall be new, of the best quality with the same brand or manufacture as used for each class of materials or equipment. All rotating equipment shall be statically and dynamically balanced.

B. Materials. Materials, apparatus, and equipment shall be first class, best of their respective kind, and conform to the standards of the Underwriters' Laboratories, Inc. Where there is UL listing, furnish only materials, apparatus, and equipment so labeled.

1. Manufacturers' Directions. All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned, as directed by the manufacturer unless specified to the contrary.

2. The Contractor shall provide any offsets, fittings, etc., as a part of this contract. All equipment and installation materials obviously intended to complete any system shall be furnished whether or not enumerated herein, without additional cost to the Engineer.

3. The Contractor shall take his own measurements and be responsible for same. He shall refer to architectural, structural, special equipment, and mechanical drawings, specifications, and approved prints for details, dimensions and location of other work.

4. The Contractor shall fully inform himself regarding any and all peculiarities and limitations for the spaces available for the installation of all work and materials furnished and installed under the Contract. The Contractor shall exercise due and particular caution to determine that all parts of work are made quickly and easily accessible.

5. The Contractor shall study all Contract Drawings and Specifications to determine any conflict with ordinances and statutes. Any errors or omissions shall be reported to the Engineer immediately.

C. Techniques

1. Access Panels. Where pull points, junction boxes or other specialties are concealed in the construction or behind a wall or non-accessible ceiling surface, the Contractor shall furnish and install an access panel of adequate size to permit service of concealed item.

2. Keys. Properly tag all keys and other devices necessary to gain access to panelboards, control panels, and equipment enclosures. Furnish a minimum of two (2) keys for each item.

3. Hangers and Supports. Immediately upon award of Contract, the Contractor shall check all building openings for admitting equipment and shall arrange with the Engineer for the proper locations of all chases, sleeves, boxes, and inserts required for the admission of and the supporting of all conduit and equipment entering into this work.

   All conduits and equipment shall be adequately supported either suspended from the construction above or by means of struts to the construction below. Suspension from metal decking will not be permitted.

   Where there is a question or problem involving proper hangers or supports, the Contractor shall furnish a sketch or otherwise propose a method satisfactory to the Engineer.

   The Contractor shall be responsible for the provision of supplementary angles, channels, plates, rods, etc., where supports are required between building structural members, spanning the space and attached to building structural members by welding, bolting or with concrete anchors which are required for suspension or support of conduit and equipment.

4. Expansion. All conduit shall be installed throughout the project with due regard for expansion. Note building expansion joints indicated on Contract Drawings. The Contractor shall provide anchors, loops or approved type expansion fittings where indicated or required for the accurate control of movement.

D. Installation and Responsibility

1. General. All materials and equipment shall be installed in a neat and workmanlike manner by competent specialists.

   a. The installation of any materials and equipment not meeting these standards may be condemned by the Engineer and shall be removed and reinstalled at no additional cost to the

Engineer. When an installation is found to be improperly installed, the Engineer will notify the Contractor to cease work at once, followed by a written order. The Contractor shall then proceed only when corrections have been made.

2. Equipment and material installed under this phase of work shall be supported from the building structure, independent of other pipe, duct, equipment, etc.

3. If deviations from Drawings are necessitated by field conditions, proposed departures shall be referred to the Engineer for written approval prior to proceeding with the work.

4. The right is reserved by the Engineer to change the location of any piece of equipment or outlet within a ten foot radius, not accessible during the initial site inspection because of finished structures, up to the time of rough-in, without any additional expense to the Engineer.

5. The Contractor shall confer and cooperate with all other Contractors whose work occurs in the same area. If this Contractor installs any of his work without such cooperation, and in doing so interferes with or prevents the installation of other work in the area, he shall bear the additional expense required to correct the situation to the satisfaction of the Engineer.

6. The Contractor shall at all times keep himself fully informed on the progress of the project construction and shall install his work that is concealed or built into the building in sufficient time to insure proper location without delays to the work of other trades.

7. Properly attend work during construction to prevent misalignment and damage to the installation. Contractor shall be responsible for coordination and expediting of all the work so that progress of the work shall be kept on schedule.

8. Installation shall, in all cases provide maximum access for removal of both mechanical and electrical materials and equipment; maintenance and sufficient head room. Particular attention is directed to removable coils, removable sections, access panels and valves.

E. Lines and Grades.

1. Refer to record drawings and surveys in order to establish lines and limits on which work will be performed.

2. The Contractor shall be held responsible for the construction of all his work to the lines, grades and elevations shown on the Contract Drawings.

F. Cutting and Patching. Perform all cutting and patching of existing materials as required for the installation of electrical work.

1. No cutting shall be done which will reduce the structural strength of the building. Keep cutting to a minimum. Where necessary, use tools and methods to prevent unnecessary damage to surrounding surfaces. Use of air hammer or star drill will be permitted with prior permission of Engineer only.

2. The Contractor shall be responsible for size and location of any drilled beams and beam flanges prior to fabrication.

3. Patching, sealing and restoration of finished surfaces shall be performed only by workmen skilled in trade necessary for restoration. The Contractor shall pay for other trades to restore work that requires patching and restoration to original condition.

3.05 FIELD QUALITY CONTROL

A. Workmanship

1. Perform all work in a neat and workmanlike manner and in full accordance with NEC "Standards of Installation".

2. Tool marks, flaws and blemishes will not be permitted on exposed materials, fixtures, or fittings. Used or out of round or badly marred piping will not be permitted.

3. Outlet boxes shall be left with cover or device plates installed with all mounting screws. Nonused knock-outs to have approved closures.

4. It is intended that all apparatus, conduit and boxes be located symmetrical with architectural elements and installed at exact height and locations shown on the Contract Drawings. Refer to details in completing and correlating work.

B. Quality Standards. Materials, equipment and workmanship shall conform in all respects to recognized standards of good quality or the respective trade.

1. Materials and equipment shall be positioned in orderly fashion and aligned with the building structure. Vertical members shall be plumb, horizontal members level, and surfaces true to plane.

2. Joinery and connection shall be accurate, close-up and well made. Tolerances for good workmanship established in published specifications by recognized national trade associations will be minimum for an acceptable standard of the respective trade work.

C. Inspection

1. The Contractor is to provide safe and adequate facilities for the inspection of construction by the Engineer, not only on the premises, but also at places where material is being stored. The fact that the work and materials have been inspected from time to time and that payments on account have been made

shall not relieve the Contractor from responsibility to remedy any defective work or materials.

2. All work shall be subject to inspection and approval by the Engineer and shall not be concealed until such inspection and approval has been made.

D. Tests and Reports

1. Test all work incidental to this contract and demonstrate to the Engineer all requirements have been met. Tests to meet applicable standards of NEMA, IEEE, and IPCEA.

2. Defective materials, equipment or connections shall be repaired or replaced and retested until satisfactory results are obtained.

3. Test all wiring and junctions for continuity and grounds before equipment is connected. As directed by the Engineer, demonstrate by megger test the insulation resistance of any selected circuit or groups of circuits.

4. Notify the Engineer 24 hours prior to any test. Tests not witnessed by the Engineer shall be substantiated in written report. Submit results to the Engineer in brochure form.

3.06 CLEANING

A. Final cleaning shall include thorough cleaning inside and outside of all panelboards and miscellaneous equipment and the leaving of every part in perfect condition ready for use. The Contractor shall remove construction markings, rust, oil, grease, plaster from all surfaces installed under this Division.

3.07 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 16060

ELECTRICAL DEMOLITION

SECTION 16060

ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination.
B. Preparation.
C. Demolition, Upgrade, and Extension of Existing Electrical Work.
D. Cleaning and Repair.
E. Installation.

1.02 RELATED SECTIONS

A. Section 16010: Basic Electrical Requirements

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for upgrading and extending work are as specified in individual Sections.

PART 3 EXECUTION

3.01 EXAMINATION. Verify field measurements and circuiting arrangements are as shown on Drawings. Verify that abandoned wiring and equipment serve only abandoned facilities. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Engineer before disturbing existing installation. Beginning of demolition means Contractor accepts existing conditions.

3.02 PREPARATION.

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Engineer at least 24 hours before partially or completely disabling system. Minimize outage duration.

3.03 DEMOLITION, UPGRADE, AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Extend and upgrade existing electrical work under provisions of this Section. Remove, relocate, and extend existing installations to accommodate new construction. Remove abandoned wiring to source of supply. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces. Disconnect abandoned outlets and remove devices.

Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

B. Disconnect and remove abandoned panelboards and distribution equipment. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed. Remove brackets, stems, hangers, and other accessories. Repair adjacent construction and finishes damaged during demolition and extension work. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate. Extend existing installations using materials and methods compatible with existing electrical installations.

3.04 CLEAN AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Panelboards. Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.05 INSTALLATION

A. Install relocated materials and equipment.

3.06 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 16102

INSTALLATION OF ELECTRICAL EQUIPMENT AND SPECIAL CONTROLLERS

SECTION 16102

INSTALLATION OF ELECTRICAL EQUIPMENT AND SPECIAL CONTROLLERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

This Specification applies to the materials and methods for installing electrical equipment. Equipment including all appurtenances shall be installed as shown on the Contract Drawings and as described herein.

1. Delivery, Storage, and Handling.
2. Installation.
3. Field Quality Control.

B. Related Sections

1. Section 11212: Submersible Sump Pump
2. Section 13709: Roof Structure
3. Section 16141: Wiring Devices
4. Section 16140: Wiring Connections and Connecting Devices

1.02 DELIVERY, STORAGE, AND HANDLING:

A. Before unloading, the Contractor shall inspect all equipment for damage in transit. Damaged equipment shall not be accepted unless authorized in writing by the Engineer.

B. Care shall be exercised during unloading and handling to prevent damage to the equipment. Slings and supports shall be of sufficient strength and number to adequately support the equipment to preclude the possibility of strain, distortion, warping of the equipment or any components. Damage incurred through improper handling by the Contractor shall be repaired or replaced at the Contractor's expense and to the satisfaction of the E[redacted]

C. Openings in equipment shall be covered to prevent entry of dirt, precipitation or other extraneous matter. Temporary covers may be of sheet metal, plywood, or waterproof fabrics if securely fastened, by finished surfaces shall be protected from damages at all times.

D. The Contractor shall be held liable for any damage to equipment or components in Contractor's care.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 COMPONENTS/ACCESSORIES

A. The Contractor shall provide all components and accessories, including but not limited to, shims, anchor bolts, and miscellaneous hardware required to properly install the equipment.

3.02 INSTALLATION

A. Equipment shall be set level, plumb, properly oriented, aligned, and secured in the location shown on the Contract Drawings.

B. Shims used for the leveling shall be of size sufficient to cover the entire bearing surface except where shims are used to level preparatory to grouting. Shims used in conjunction with grouting shall be located to properly support equipment at load points to prevent any distortion.

C. Contractor shall notify the Engineer in advance of any on-site assembly operation; such operations shall be carried on with the full knowledge of the Engineer.

D. Assembly and installation of the equipment shall be in strict compliance with the equipment manufacturer's instructions.

E. Where specified, equipment shall be assembled, installed, inspected and adjusted under the supervision of the manufacturer's representative.

F. Contractor shall supply and install self-anchoring anchors as shown on the Drawings.

G. The Contractor shall grout under the equipment to effect a firm permanent setting as shown on Contract Drawings, or specified by equipment manufacturer.

H. All electrical connections including all bus bolting on electrical equipment shall be checked for tightness.

3.02 FIELD QUALITY CONTROL

A. Tests

1. Insulation Test. After the connection of all shipping splits, but before connection of any wiring, 600 volt busses shall be meggered and phase to ground as a final check. Minimum acceptable values shall be three (3) megohms (unless otherwise specified) as measured with a 500 volt megger. The minimum acceptable unbalance in the readings shall be 25 percent. All readings shall be reported in writing to the Engineer.

B. Inspection. The Contractor shall conduct such inspections and tests to confirm that the equipment has been set and connected according to the Contract Drawings. Contractor shall complete all test and inspection report forms as required by the Engineer.

3.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in contract LUMP SUM price.

END OF SECTION

SECTION 16111

CONDUIT

SECTION 16111

CONDUIT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Metal conduit.
2. Electrical metallic tubing.
3. Nonmetal conduit.
4. Electrical nonmetallic tubing.
5. Fittings and conduit bodies.

B. Related Sections

1. Section 16010: Basic Electrical Requirements
2. Section 16130: Electrical Boxes and Fittings
3. Section 16060: Electrical Demolition

1.02 REFERENCES

ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

ANSI C80.5 - Rigid Aluminum Conduit.

ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

ANSI/NFPA 70 - National Electrical Code.

NECA "Standard of Installation."

NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.03 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70.

1.04 SUBMITTALS

A. Submit in accordance with Section 01340: Shop Drawings, Product Data and Samples.

B. Product Data. Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, nonmetallic tubing, fittings, and conduit bodies.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01700: Demobilization and Project Closeout.
B. Accurately record actual routing of conduits larger than 2 inches (51 mm).

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept conduit on site. Inspect for damage.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.08 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.
B. Verify routing and termination locations of conduit prior to rough-in.
C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Minimum Size: 1/2 inch (13 mm) unless otherwise specified. Size shall be as required to facilitate installation of required number and size of wires.

B. Underground Installations

1. More than Five Feet from Foundation Wall: Use PVC conduit.
2. Within Five Feet from Foundation Wall: Use rigid steel conduit.
3. In or Under Slab on Grade: Use rigid steel conduit.
4. Minimum Size: 3/4 inch (19 mm).

C. Outdoor Locations, Above Grade: Use rigid steel and electrical metallic tubing.

2.02 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.
B. Rigid Aluminum Conduit: ANSI C80.5.
C. Intermediate Metal Conduit (IMC): Rigid steel.
D. Fittings and Conduit Bodies:ANSI/NEMA FB 1; material to match conduit.

2.03 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.
B. Fittings: ANSI/NEMA FB 1.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.
B. Fittings: ANSI/NEMA FB 1.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.
B. Fittings and Conduit Bodies:ANSI/NEMA FB 1; steel compression set screw type.

2.06 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 80 PVC.
B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install conduit in accordance with NEC "Standard of Installation."

B. Install nonmetallic conduit in accordance with manufacturer's instructions.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

E. Group related conduits; support using conduit rack. Construct rack using steel channel.

F. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

G. Do not attach conduit to roof support wires.

H. Arrange conduit to maintain headroom and present neat appearance.

I. Route conduit parallel and perpendicular to columns and walls.

J. Route conduit installed above accessible ceilings parallel and perpendicular to walls and columns.

K. Route conduit in and under slabs from point-to-point.

L. Do not cross conduits in slabs.

M. Maintain adequate clearance between conduit and piping.

N. Maintain 12 inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).

O. Cut conduit square using saw or pipecutter; de-burr cut ends.

P. Bring conduit to shoulder of fittings; fasten securely.

Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

R. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.

S. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.

T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.

V. Provide suitable pull string in each empty conduit except sleeves and nipples.

W. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

X. Ground and bond conduit under provisions of Section 16670: Lightning Protection Systems.

Y. Identify conduit under provisions of Section 16195: Identification.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified.

3.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 16123

BUILDING WIRE AND CABLE

SECTION 16123

BUILDING WIRE AND CABLE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Building wire and cable.
2. Nonmetallic-sheathed cable.
3. Underground feeder and branch circuit cable.
4. Service entrance cable.
5. Armored cable.
6. Metal clad cable.
7. Wiring connectors and connections.

B. Related Sections

1. Section 16111: Conduit
2. Section 16130: Electrical Boxes and Fittings
3. Section 16195: Identification

1.02 REFERENCES

ANSI/NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

A. Submit under provisions of Section 01340.

B. Product Data. Provide for each cable assembly type used.

C. Test Reports. Indicate procedures and values obtained.

D. Manufacturer's Installation Instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.04 QUALIFICATIONS

A. Manufacturer. Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.
B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 FIELD SAMPLES

A. Provide under provisions of Section 01340: Shop Drawings, Product Data and Samples.
B. Submit one length, each 18 inches (450 mm) of cable assembly from each reel.
C. Select each length to include complete set of manufacturer markings.
D. Attach tag indicating cable size and application information.

1.07 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.

C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.08 COORDINATION

A. Determine required separation between cable and other work.
B. Determine cable routing to avoid interference with other work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Appleton Electric
B. Emerson Electric
C. Crouse-Hinds
D. Harvey Hubbell
E. OZ/Gedney

2.02 BUILDING WIRE AND CABLE

A. Description: Single conductor insulated wire.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation: ANSI/NFPA 70, Type THHN/THWN.

2.03 UNDERGROUND FEEDER AND BRANCH CIRCUIT CABLE

A. Description: ANSI/NFPA 70, Type UF.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation Temperature Rating: 90 degrees C.

PART 3 EXECUTION

3.01 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.02 WIRING METHODS

A. Concealed Dry Interior Locations. Use only building wire, Type TW or THW insulation, in raceway, nonmetallic- sheathed cable.

B. Exposed Dry Interior Locations. Use only building wire, Type TW or THW insulation, in raceway, nonmetallic-sheathed cable.

C. Wet or Damp Interior Locations. Use only building wire Type TW or THW insulation, or as shown on Drawings.

D. Exterior Locations. Use only building wire THHN/THWN insulation, or as shown on Drawings.

E. Underground Installations. Use only THHN/THWN insulation, or as shown on Drawings.

3.03 INSTALLATION

A. Install products in accordance with manufacturers instructions.

B. Use solid conductor for feeders and branch circuits 10 AWG and smaller.

C. Use stranded conductors for control circuits.

D. Use conductor not smaller than 10 AWG for power and lighting circuits.

E. Use conductor not smaller than 12 AWG for control circuits.

F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 50 feet.

G. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 100 feet.

H. Pull all conductors into raceway at same time.

I. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

J. Protect exposed cable from damage.

K. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.

L. Use suitable cable fittings and connectors.

M. Neatly train and lace wiring inside boxes, equipment, and panelboards.

N. Clean conductor surfaces before installing lugs and connectors.

O. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

P. Terminate aluminum conductors with tin-plated aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.

Q. Use suitable reducing connectors or mechanical connector adapters for connecting aluminum conductors to copper conductors.

R. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

S. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

T. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Identify wire and cable under provisions of Section 16195: Identification.
B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing.
B. Inspect wire for physical damage and proper connection.
C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
D. Verify continuity of each branch circuit conductor.

3.06 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in contract LUMP SUM price.

END OF SECTION

SECTION 16130

ELECTRICAL BOXES AND FITTINGS

SECTION 16130

ELECTRICAL BOXES AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Extent of electrical box and associated fittings work is indicated on the Contract Drawings and specified herein.

2. Types of electrical boxes and fittings specified in this section include the following:

a. Outlet boxes
b. Junction boxes

B. Related Sections

1. Section 16111: Conduit
2. Section 16141: Wiring Devices

1.02 REFERENCES

ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

ANSI/NFPA 70 - National Electrical Code.

NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

FS-W-C-586 - Electrical Cast Metal Conduit Outlet Boxes, Bodies and Entrance Caps.

Underwriters Laboratory (UL).

1.03 SYSTEM DESCRIPTION

A. Electrical systems are generally diagrammatic and locations for outlets and equipment are approximate, except where specifically noted. Govern the exact routing of raceways, locations of outlets and equipment by structural conditions, installations by other trades, cabinetry and obstruction. This is not to be construed to permit redesigning systems.

B. The Engineer reserves the right to make any reasonable change in location of outlets and equipment within 10 feet prior to roughing-in without involving additional expense.

1.04 SUBMITTALS

A. Comply with applicable requirements of Division 1.
B. Catalog Data. Submit catalog data sheets for all boxes and fittings.

1.05 QUALITY ASSURANCE

A. Qualifications. Installation of electrical boxes and fittings shall be performed by qualified personnel of a firm regularly engaged in the installation of systems with electrical boxes and fittings for at least five years.

1. Provide products of a manufacturer engaged in the manufacture of electrical boxes and fittings for at least three years.

B. Regulatory Requirements

1. Conform to requirements of ANSI/NFPA 70.

2. Furnish products listed and labeled by Underwriters Laboratories, Inc.

3. NEC compliance. Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings. Special care shall be used to size boxes relative to wire and device fill area, space required for conduit entrance, and proper access.

4. Federal Specification Compliance. Comply with applicable requirements of FS-W-C-586, "Electrical Cast Metal Conduit Outlet Boxes, Bodies, and Entrance Caps.

1.06 PROJECT CONDITIONS

A. Existing Conditions. The Contractor shall be responsible for coordinating the work with other crafts to minimize interferences. Contractor shall not cut, drill, or burn structural steel or equipment in any manner except where permission is granted by the Engineer.

B. Verify field measurements are as shown on Contract Drawings.

C. Verify exact locations of floor boxes with Engineer prior to rough-in.

D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Install within 3 feet of location shown.

1.07 SEQUENCE AND SCHEDULING

A. Coordinate the locations and mounting characteristics of all electrical equipment and materials, with the work to be performed by other trades. Coordination is for the purpose of avoiding any interferences with the work of other disciplines.

B. Set electrical items in a manner to clear overhead doors, ductwork, piping, and other miscellaneous equipment. Maintain symmetry of all units as closely as possible within the architectural section contained.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following Manufacturer:

1. Appleton Electric
2. Emerson Electric
3. Crouse-Hinds
4. Harvey Hubbell
5. OZ/Gedney

2.02 PRODUCTS

A. Outlet boxes: Provide galvanized flat rolled sheet steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including depths, sized per NEC. Boxes shall be suitable for installation at respective locations. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.

B. Device boxes: Provide galvanized flat rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as required, suitable for installation at respective locations. Provide cable clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding.

C. Raintight Outlet Boxes: Provide corrosion-resistant cast-metal raintight outlet wiring boxes, of types, shapes, and sizes, (including depth of boxes), with threaded conduit holes for fastening electrical conduit, cast-metal face plates with spring-hinged watertight caps suitably configured for each application, including face plate gaskets and corrosion-resistant plugs and fasteners.

D. Junction and pull boxes: Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers, of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers.

E. Bushings, knockout closures, and locknuts: Provide corrosion-resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

2.03 ACCESSORIES

A. Outlet box accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps, and metal straps for supporting outlet boxes. All accessories shall be compatible with outlet boxes being used to fulfill installation requirement for individual wiring situations.

B. Device box accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, and switch box supports.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Contractor shall visit the site and verify all of the existing conditions for himself. If any discrepancy exists between the existing conditions and the Contract Drawings, this shall be brought to the Engineer's attention, and the Contractor's bid should be adjusted accordingly. No allowances shall be made for changes in the contract price for existing conditions once a Contract has been signed.

3.02 INSTALLATION

A. General: Install electrical boxes and fittings as indicated on Contract Drawings, in accordance with manufacturer's written instructions, and applicable requirements of NEC and NECA's "Standard of Installation" and in accordance with recognized industry practices to fulfill project requirements.

B. The following elevations shall govern unless otherwise noted on Contract Drawings:

1. Convenience outlets - Finished areas - 16" to bottom A.F.F.

2. Convenience outlets - Unfinished areas - 24" to bottom A.F.F.

3. Wall Switch - 48" to bottom A.F.F. installed on the lock side of the door.

4. Wall Telephones - 60" maximum to top of telephone.

5. Telephone outlets - 16" to bottom A.F.F.

C. The following items apply to all boxes:

1. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.

2. Install weathertight ground fault circuit interrupter protected outlets for all exterior locations and all locations exposed to weather or moisture.

3. Install electrical boxes in only those locations which ensure ready accessibility to enclosed electrical wiring.

4. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls.

5. Use stamped steel bridges to fasten flush mounting outlet box between studs.

6. Support boxes independently of conduit.

7. Use gang box where more than one device is mounted together. Do not use sectional box.

8. Use gang box with plaster ring for single device outlets.

9. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.

10. Large Pull Boxes: Boxes larger than 100 cubic inches (1600 cubic centimeters) in volume or 12 inches (300 mm) in any dimension.

    a. Interior Dry Locations. Use hinged painted steel enclosure.
    b. Other Locations. Use surface-mounted cast metal box.

11. Avoid installing aluminum products in concrete.

12. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surfaces.

13. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces, or solidly embed electrical boxes in concrete or masonry.

14. Install electrical connections in installed boxes.

15. Existing concrete walls shall be wired with surface mounting wiring and equipment.

16. Conduit straight runs of more than 100 feet and/or with more than two right angle bends shall have pull box at convenient intermediate location, whether or not indicated on Drawings.

17. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

18. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

19. Inaccessible Ceiling Areas. Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.

20. Install boxes to preserve fire resistance rating of partitions and other elements.

3.03 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.
B. Install knockout closure in unused box opening.

3.04 CLEANING

A. Clean all debris and dirt from boxes after installation.

3.05 PROTECTION

A. Subsequent to installation of boxes, protect boxes from construction debris and damage.

3.06 MEASUREMENT & PAYMENT

A. No separate payment will be made for work performed under this section. Include cost of such work in the contract LUMP SUM price.

END OF SECTION

SECTION 16140

WIRE CONNECTIONS AND CONNECTING DEVICES

SECTION 16140

WIRE CONNECTIONS AND CONNECTING DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Extent of electrical connections for equipment is indicated by Contract Drawings and Specifications.

B. Related Sections

1. Section 16010: Basic Electrical Requirements

1.02 REFERENCES

NFPA-70 - National Electrical Code.

IEEE Std. 241, "IEEE Recommended Practice for Electrical Power Systems in Commercial Buildings".

ANSI/NEMA and ANSI/EIA standards.

UL Std. 486A, "Wire connectors and Soldering Lugs" for use with copper conductors.

1.03 SUBMITTALS

A. Comply with applicable requirements of Division 1.

B. Catalog Data

1. Provide catalog data sheets for all connecting devices and accessories.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements

1. Comply with applicable requirements of the NEC as to type products used and installation of electrical power connections (terminals and splices), for junction boxes, motor starters, and disconnect switches.

2. Comply with Std. 241, "IEEE Recommended Practice for Electrical Power Systems in Commercial Buildings" pertaining to connections and terminations.

3. ANSI Compliance: Comply with applicable requirements of ANSI/NEMA and ANSI/EIA standards pertaining to products and installation of electrical connections for equipment.

4. Comply with Std. 486A, "Wire connectors and Soldering Lugs" for use with copper conductors, including but not limited to, tightening or electrical connectors to torque values indicated. Provide electrical connection products and materials which are UL listed and labeled.

5. Provide electrical connection products and materials which are UL listed and labeled.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver electrical connection products wrapped in proper factory fabricated type containers.

B. Store electrical connection products in original cartons and protect from weather, construction traffic and debris.

C. Handle electrical connection products carefully to prevent breakage, denting, and scoring finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following (for each type of product):

1. Adalet-Plm Div., Scott and Fetzer Co.
2. Allen-Stevens Conduit Fittings Corp.
3. AMP Inc.
4. Appleton Electric Co.
5. Arrow-Hart Div., Crouse-Hinds Co.
6. Burndy Corp.
7. General Electric Co.
8. Harvey Hubbell
9. Ideal Industries
10. Pyle National Co.
11. Square D Company
12. Thomas and Betts Corp.
13. Buchannon

2.02 MATERIALS

A. For each electrical connection indicated, install complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.

B. Self striping, electrical pigtail and tap connectors will not be allowed.

C. Install electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended applications.

2.03 ACCESSORIES

A. Install electrical insulating tape, heat-shrinkable insulating tubing and boots, electrical solder, electrical soldering flux, wirenuts, and cable ties as recommended for use by accessories manufacturers for type services indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Contractor shall visit the site and verify all of the existing conditions for himself. If any discrepancy exists between the existing conditions and the Contract Drawings, this shall be brought to the Engineer's attention, and the Contractor's bid should be adjusted accordingly. No allowances shall be made for changes in the Contract price for existing conditions once a Contract has been signed.

B. Inspect area and conditions under which electrical connections for equipment are to be installed and notify Contracting Officer in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.02 INSTALLATION

A. Techniques

1. Install electrical connections as indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices, and complying with applicable requirements of UL, NEC, and NECA's "Standard of Installation" to ensure that products fulfill requirements. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

2. Maintain existing electrical service and feeders to occupied areas and operational facilities, unless otherwise indicated, or when authorized otherwise in writing by Contracting Officer. Provide temporary service during interruptions to existing facilities. When necessary, schedule momentary outages for replacing existing wiring systems with new wiring systems. When that "cutting over" has been successfully accomplished, remove, relocate, or abandon existing wiring as indicated.

3. Cover splices with electrical insulating material equivalent to, or greater insulation resistivity rating, than electrical insulation rating of those conductors being spliced.

4. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will

remain on conductors. Also avoid "ringing copper conductors while skinning wire.

5. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

6. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.

7. Provide flexible conduit from junction boxes to recessed lights.

8. Provide liquid tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subjected to one or more of the following combinations:

   a. Exterior location.
   b. Moist or humid atmosphere where condensate can be expected to accumulate.
   c. Corrosive atmosphere.
   d. Water spray.
   e. Dripping oil, grease, or water.

B. Coordinate with other work, including wires/cables, raceway and equipment installation, as necessary to properly interface installation of electrical connections with other work.

3.03 FIELD QUALITY CONTROL

A. Tests. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of motors fulfill requirements. Correct malfunctioning units at site, then retest to demonstrate compliance.

3.04 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 16141

WIRING DEVICES

SECTION 16141

WIRING DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Receptacles.
2. Device Plates and Decorative Box Covers.
3. Poke-Through Service Fittings.

B. Related Sections

1. Section 16010: Basic Electrical Requirements
2. Section 16130: Electrical Boxes and Fittings

1.02 REFERENCES

NEMA WD 1 - General Purpose Wiring Devices.

NEMA WD 6 - Wiring Device Configurations.

NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

A. Comply with applicable requirements of Division 1.

B. Catalog Data

1. Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Operating Instructions:

1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.

D. Installation Instructions

1. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.

1.04 QUALITY ASSURANCE

A. Qualifications

1. Installation of devices shall be performed by qualified personnel of a firm regularly engaged in the installation of such devices for at least five years.

2. Provide products of a manufacturer engaged in the manufacture of the types of wiring devices specified herein, for at least three years.

1.05 PROJECT/SITE CONDITIONS

A. Job Conditions: The Seller shall be responsible for coordinating the work with other crafts to minimize interferences. Seller shall not cut, drill, or burn structural steel or equipment in any manner except where permission is granted by the Engineer.

1.06 SEQUENCE AND SCHEDULING

A. Coordinate the locations and mounting characteristics of all electrical equipment and materials, with the work to be performed by other trades. Coordination is for the purpose of avoiding any interferences with the work of other disciplines.

B. Set electrical items in a manner to clear overhead doors, ductwork, piping, and other miscellaneous equipment. Maintain symmetry of all units as closely as possible within the architectural section contained.

PART 2 PRODUCTS

2.01 MATERIALS

A. Receptacles

1. General purpose duplex receptacles shall be automatic grounding type, specification grade, with provisions for back wiring by means of spring-staked screws or side wiring with captive held binding screws, shall comply with NEMA Standard WD1, paragraph 3.02 and Federal Specification WC596. Front shall be high impact thermoplastic such as nylon. Back shall be thermoset or thermoplastic material.

2. Interchangeable type receptacles may be used because of problems encountered during construction, however, specific permission is required from the Engineer before use of these devices.

3. All devices shall be gray. Surface devices in unfinished areas shall be gray with galvanized steel coverplates.

4. Description and Manufacturer as basis of design:

Receptacle Duty	Hubbell
20A-125 V (gray)	5362-GRY
GFCI (gray) 20A-125 V	GF-5362-GY
Duplex Emergency 20A-125 V	8300 Series

2.02 ACCESSORIES

A. Cover Plates

1. Plates shall be at least "0.040" thick, corrosion resistant metal. Plate shall be smooth style.

2. Cover plates for interior, unfinished spaces such as equipment rooms, that are flush mounted, shall be the same as those specified for interior finished spaces; if surface mounted, cover plates shall be galvanized steel type.

3. Weatherproof plates for horizontally mounted duplex receptacles shall consist of a double cover, and a neoprene gasketed seal between plate and wall. Crouse Hinds WLRS/WLRD, for flush mounting use adaptor WLRA-1, as basis for design.

4. Plates in equipment rooms shall be galvanized steel.

5. Where plates are indicated on the Drawings to be identified, such identifications shall be black filling of 1/8 inch high engraved characters. The wording shall be per Drawings, except that abbreviations may be used where necessary to suit available space on plate. Note that many of the more common identifications are manufacturers standards.

6. Cover plates in finished spaces shall be painted metal.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Seller shall visit the site and verify all of the existing conditions for himself. If any discrepancy exists between the existing conditions and the contract drawings, this shall be brought to the Engineer's attention, and the Contractor's bid should be adjusted accordingly. No allowances shall be made for changes in the contract price for existing conditions once a Contract has been signed.

B. Verify outlet boxes are installed at proper height.

C. Verify wall openings are neatly cut and will be completely covered by wall plates.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

E. Verify openings in access floor are in proper locations.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.03 INSTALLATION

A. General

1. Devices occurring at the same elevation are to be equally spaced and to be in alignment.

2. Install products in accordance with manufacturer's instructions.

3. Install devices and coverplates plumb and level.

4. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

5. Install decorative plates on switch, receptacle, and blank outlet in finished areas.

6. Connect wiring devices by wrapping conductor around screw terminal.

7. Use jumbo size plates for outlets installed in masonry walls.

8. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

9. Install protective rings on active flush cover service fittings.

B. Interface With Other Products

1. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights specified and indicated on Drawings.

3.04 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.
B. Operate each wall switch with circuit energized and verify proper operation.
C. Verify that each receptacle device is energized.
D. Test each receptacle device for proper polarity.
E. Test each GFCI receptacle device for proper operation.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 16195

IDENTIFICATION

SECTION 16195

IDENTIFICATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. This specification covers the materials, workmanship, standards, and installation for permanent identification of electrical equipment and systems.

2. Nameplates and tape labels.

3. Wire and cable markers.

4. Conduit color coding.

B. Related Sections

1. Section 09900: Painting

2. Section 16040: Basic Electrical Requirements

1.02 REFERENCES

Underwriters Laboratory (UL).

ANSI/NFPA-70 - National Electrical Code.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements

1. Disconnecting means for motors, equipment, appliances, and each service, feeder, and branch circuit at its point of origin shall be legibly identified to indicate its purpose.

2. Junction boxes for all appliances and motors that do not have a local disconnect shall have a nameplate installed that clearly indicates the source of power. Nameplate shall show panel, circuit, location of panel, name of equipment, and voltage.

3. The contractor shall identify and label all electrical items indicated or shown on the Contract Drawings and as specified herein.

4. Identification shall be installed after all contract painting is complete.

5. The identification nameplates shall be in addition to the manufacturer's

equipment nameplates required by the National Electric Code, NEMA, or UL.

6. Each nameplates shall have the following information:

- Name of equipment
- System voltage (primary & secondary)
- Transformer KVA
- Number of Phases
- Number of system wires
- Source of power or to where the device provides power.

1.04 SUBMITTALS

A. Comply with applicable requirements of Division 1.

B. Shop Drawings. Submit shop drawings including schedule for nameplates and tape labels.

C. Catalog Data. Submit catalog data under provisions of Division 1 for labeling materials.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Installation of electrical identification shall be performed by qualified personnel of a firm regularly engaged in the installation of products specified herein for at least five years.

2. Provide products of a manufacturer engaged in the manufacture of labels and nameplates for at least three years.

B. Regulatory Requirements

1. Provide products which are listed and labeled by Underwriters Laboratory for the use intended.

1.06 SEQUENCE AND SCHEDULING

A. Coordinate the locations and mounting characteristics of all electrical equipment and materials, with the work to be performed by other trades. Coordination is for the purpose of avoiding any interferences with the work of other disciplines.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with the Specifications provide identification materials of one of the following:

1. Thomas & Bettes
2. W.H. Brady Corp.
3. Markel Co.
4. Monarch Marking
5. Pandult Corp.
6. Seton Nameplate

2.02 MATERIALS

1. Nameplates shall be made of black and white sandwich type plastic with white letters on black back-ground. Letter size shall be no less than 1/8 inch for control devices, push-button, etc., and 1/4 inch for distribution panels, control panels, etc., unless otherwise shown or specified.

2. Wire markers shall be on waterproof cloth tape of high adhesion and tensile strength, T&B "Blue" or Bradey.

3. Cables in cable trays and manholes shall be identified with stamped metal tags of non-corrodible metal.

PART 3 EXECUTION

3.01 PREPARATION

A. Surface Preparation

1. Properly clean and dry all surfaces according to manufacturers instruction before applying any adhesive products.

2. Use adhesives designed for the materials to be bonded together.

3.02 INSTALLATION

A. General

1. Each item of electrical equipment shall be properly identified by means of a nameplate attached to the front, surface of the equipment.

2. Each nameplate shall be so located on the equipment so that it is completely visible when viewed from the front or normal position of operating and maintenance personnel.

3. Degrease and clean surfaces to receive nameplates and tape labels.

4. Install nameplates and tape labels parallel to equipment lines.

5. Nameplates shall be mounted with round head screws (preferred) or with a suitable cement.

B. Panels

1. Identification shall conform to the following Mound Standard:

   a. Panels at 480 volts and 240 volts, 3 phase: PP

   b. Panels at 208/120 volts, 3 phase and 240/120 volts, single phase: LP

   c. Room number shall follow the above designations. For example: LP123 designates Lighting Panel in room 123 of the building that the panel is located in.

   d. Multiple panels in a single room shall be labeled as above with the added suffix of A, B, C, etc. Starting with the second panel.

   e. Special cases shall add a designated prefix to the PP and LP identification:

      E - Emergency Power (cover shall be painted yellow)
      U - Uninterruptible Power Source
      C - Conditioned Power
      D - Direct Current

   f. The order of designation shall be: _ _ _-_ _ _-_
      1 2 2 3 3 3 4

      1=Prefix for special case (E, U, C, D)
      2=PP or LP
      3=Building 34 Addition (34A)
      4=Additional Panel (A, B, C, etc.)

2. Panel Directories

   a. Distribution panels shall be provided with a typed or neatly printed directory. Circuits shall be identified as identified on the panel drawing layouts or as directed in the field.

   b. Directory shall indicate source of power, including building.

   c. Circuit additions to existing panels shall be properly labeled on existing panel directories. Where the new entries cannot be neatly and legibly added, a new directory shall be prepared and installed.

C. Receptacle Identification. Receptacles in all areas shall be identified with DYMO Label or other neat and legible marking means. Marking shall indicate panel source and breaker number.

D. Wire Identification. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring.

3.03 MEASUREMENT & PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 16475

OVERCURRENT PROTECTIVE DEVICES

SECTION 16475

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. This specification covers fuses and circuit breakers rated 600 volts and below.

B. Related Sections

1. Section 16123: BUILDING WIRE AND CABLE.

1.02 REFERENCES

ANSI/NFPA 70 - National Electrical Code.

Underwriters Laboratory (UL).

NEMA STD. No. AB1, AB2, and SG3.

ANSI C97.1.

FS-W-C-375 B/GEN.

1.03 SUBMITTALS

A. Comply with applicable requirements of Division 1.
B. Catalog Data

1. Provide catalog data including device ratings, physical dimensions and weights.

1.04 QUALITY ASSURANCE

A. Qualifications

1. Provide products of a manufacturer regularly engaged in the manufacture of the types of products specified herein for a minimum of five years.

B. Regulatory Requirements

1. NEC Compliance: Comply with NEC requirements pertaining to overcurrent protective devices.

2. UL Compliance: Comply with UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures", and UL 198D, "High Interrupting Capacity Class K Fuses." Provide overcurrent protective devices which are UL listed and labeled.

3. NEMA Compliance: Comply with NEMA Std. Pub. Nos. AB1, AB2, and SG3 pertaining to molded case and low voltage power type circuit breakers.

4. ANSI Compliance: Comply with ANSI C97.1 pertaining to low voltage cartridge fuses.

5. FS Compliance: Comply with Federal Specification W-C-375B/GEN pertaining to molded case circuit breakers.

PART 2 PRODUCTS

2.01 MANUFACTURERS. Provide overcurrent protective devices of one of the following (for each type and rating of overcurrent protective device):

B. Circuit Breakers

1. Square D.

B. Fuses

1. Bussman Div.
2. Cooper Power Systems.
3. General Electric Co.

2.02 MATERIALS

A. Circuit Breakers

1. Circuit Breakers: Install circuit breakers and ancillary components, of types, sizes, ratings, and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation.

2. Molded Case Circuit Breakers: Install factory assembled molded case circuit breakers of frame size, rated amperes, voltage, poles, with symmetrical ampere interrupting rating as indicated on Contract Drawings. Install breakers with permanent thermal and instantaneous magnetic trips in each pole, ampere ratings as indicated. Construct with overcenter, trip free, toggle type operating mechanisms with quick make, quick break action and positive handle trip indication. Install push to trip button on cover for mechanical tripping circuit breakers. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40 degrees C. Install breakers with mechanical screw type removable connector lugs, AL/CU rated. Breakers shall be plug on type.

B. Fuses

1. Class RK1 time delay fuses: Install UL Class RK1 time delay fuses rated 600V, 60 Hz, with 200,000 RMS symmetrical interrupting current rating for protective motors.

2. Class R1 and Class J Current Limiting Fuses: Provide UL Class R1 and Class J current limiting fuses rated 600 volts, 60 Hz, with 200,000 RMS symmetrical interrupting current rating for protecting circuit breakers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install overcurrent protective devices as indicated on Contract Drawings, in accordance with manufacturer's written instructions and with recognized industry practices.

B. Comply with NEC and NEMA standards for installation of overcurrent protective devices.

C. Fasten circuit breakers without mechanical stress, twisting, or misalignment being exerted by clamps, supports, or cabling.

D. Set field adjustable circuit breakers for trip settings as indicated, subsequent to installation of units.

E. Install fuses, if any, in fused circuit breakers.

F. Install fuses in fusible switches and disconnects.

3.02 FIELD QUALITY CONTROL

A. Inspect circuit breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

B. Test devices for continuity of circuitry and for short circuits prior to energization of overcurrent protective devices. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise remove and replace with new units and proceed with retesting.

3.03 ADJUSTING

A. Check adjustable circuit breakers for proper coordination with other units and then adjust accordingly to ensure proper coordination.

3.04 MEASUREMENT & PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

SECTION 16670

LIGHTNING PROTECTION SYSTEMS

SECTION 16670

LIGHTNING PROTECTION SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. This specification covers the materials, workmanship, standards and installation of Lightning Protection Systems for buildings and miscellaneous structures.

2. Lightning Protection System for Roof Structure.

3. Types of lightning protection system material and components specified in this section include the following:

Air terminals
Bonding plates
Conductors
Connectors
Grounding plates
Grounding rods
Rod clamps
Splicers
Wire, cable

B. Related Sections

1. Section 16010: Basic Electrical Requirements

1.02 REFERENCES

ANSI/NFPA 78 - Lightning Protection Code.

ANSI/UL 96 - Lightning Protection Components.

NFPA 70 - National Electrical Code.

UL 96A - Installation Requirements for Lightning Protection Systems.

ANSI C2 - National Electrical Safety Code.

ANSI/IEEE C62.1 - Standard for Surge Arrester for AC Power Circuits.

ANSI/IEEE C62.2 - Guide For the Application of Gapped Silicon - Carbide Surge Arresters for Alternating - Current Systems.

Lightning Protection Institute (LPI) STD 175 - Standard of Practice.

LPI 176 - Materials Manual.

LPI 177 - Inspection Guide.

1.03 DEFINITIONS

A. For definition of Lightning Protection System terms, refer to NFPA 78.

1.04 SYSTEM DESCRIPTION

A. Design Requirements. The lightning protection system shall be Class I or II in accordance with the requirements of ANSI/NFPA 78 and components shall be UL 96 listed. This system shall provide lightning protection for (Building/Structure) and shall consist of air terminals on roofs (or roof-mounted equipment, chimneys, stacks); bonding of the structure being protected and other metal objects; grounding electrodes; and interconnecting conductors.

1.05 SUBMITTALS

A. Comply with applicable requirements of Division 1.

B. Shop Drawings. Submit shop drawings showing layout of air terminals, grounding electrodes, and bonding connections to structures and other metal objects. Include air terminal, electrode and conductor sizes.

C. Certifications. Submit documents indicating material/components listing in accordance with ANSI/UL 96.

D. Elementary Diagrams and Wiring Diagrams. Submit wiring, connection, and termination drawings.

E. Installation Instructions. Field assembly and installation of all equipment, components and accessories.

F. Maintenance Instructions. Maintenance of all equipment, components and accessories.

G. Catalog Data. Submit catalog data showing dimensions and materials of each component.

H. Laboratory and Field Test Reports. Submit test data in support of the ANSI/UL 96 certifications.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Installation of the lightning protection system shall be performed by qualified personnel of a firm regularly engaged in the installation of these systems for at least five years and is a member of the Lightning Protection Institute (LPI).

2. Provide products of manufacturers engaged in the manufacture of lightning protection system components for at least three years.

B. Regulatory Requirements

1. Provide products which are listed and labeled by Underwriters Laboratory (UL) for their intended use.

1.07 PROJECT/SITE CONDITIONS

A. Field Measurements. The Seller shall be responsible for all field measurements and verification of any dimensions shown on Contract Drawings

1.08 SEQUENCE AND SCHEDULING

A. Coordinate the location and mounting of the components with any work to be performed by other trades. Coordination is for the purpose of avoiding any interferences with the work of other disciplines.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with the requirements of this specification, provide lightning protection system materials and components of one of the following:

1. Capital Lightning Protection Co., Inc.
2. Hargar Lightning Protection.
3. Thompson Lightning Protection, Inc.

2.02 MATERIALS

A. Provide lightning protection system material and components, of the types, sizes, and ratings for the class of service indicated, which comply with the manufacturer's standard materials and design, in accordance with published product information. All materials shall be resistant to corrosive dangers in the environment. Where the type of components or materials are not otherwise indicated, comply with NFPA 78 and LPI standards.

1. Air terminals shall be the solid type and the material shall be 95 percent copper. Air terminals shall be 24 inches in length unless otherwise indicated.

2. Conductors shall be multiple strand cable, size 4/0. Material shall be 95 percent copper.

3. Connectors shall be 4 inch bronze parallel bonding clamp for connecting 2/0 - 250 MCM cables.

4. Splicers shall be bronze pressure type "T" cable splicer for clamping standard cables 2/0 through 250 MCM, with hex bolts and washers.

5. Rod Clamps shall be 4 inch bronze ground rod clamp for connecting cable, up to and including 250 MCM, and 3/4 inch ground rod.

6. Grounding plates shall be copper.

7. Grounding rods shall be 5/8 inch diameter and 10 feet long, made of solid copper unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Seller shall visit the site and verify all of the existing conditions. If any discrepancy exists between the existing conditions and the contract drawings, this is to be brought to the Engineer's attention and the Contractor shall adjust the bid accordingly.

B. Verify that surfaces are ready to receive work.

C. Verify that field measurements are as shown on the Contract Drawings.

D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

A. Protection. Protect items surrounding the areas of work, to be done per this Section, from damage or disfiguration.

3.03 INSTALLATION

A. General

1. Install components in accordance with the requirements listed in this specification, Contract Drawings, manufacturer's instruction, NFPA 70 (NEC), and NFPA 78. If conflicts exist between these documents, the project documents (Specifications, Contract Drawings, etc.) shall be followed. Conflicts are to be immediately brought to the attention of the Engineer.

2. Coordinate with other work, including electrical wiring and roofing work, as necessary to provide a proper interface for the installation of the lightning protection system.

3. Use 24 inch air terminals. Mount the point 24 inches above the protected surface for 25 inch protection. Air terminal spacing shall be based on the 100 foot stringing distance but in no case shall there be over 25 feet spacing from terminal to terminal. Mount air terminals 20 feet to 25 feet on center along perimeter of building and not greater than 25 inches from the ends of ridges or edges of corners of roofs. Install air terminals every 30 feet on flat portions of roofs.

4. All mechanical and structural roof penetrations extending outside the protected zone shall be provided with air terminals and bonding to main lightning

interconnecting conductor.

5. Use 4/0 bare stranded copper for bonding. Interconnect all air terminals together with conductors so that there are two paths from each air terminal to the ground terminal system.

6. Copper ground wires shall not be installed on aluminum roofing or siding. Install conductors with direct paths from air terminals to ground connections avoiding sharp bends and narrow loops. Air terminal conductors may run down or horizontal from air terminals but never upward thus preventing pockets where lightning may be caught. Conductors shall have no less than an 8 inch diameter bend and no greater than a 90 degree turns.

7. Parts of the system subject to mechanical injury shall be protected with conduit, the guard should be electrically connected to the conductor at each end.

8. Provide at least two down conductors on any structure. Install additional down conductors every 100 feet along the perimeter. Protect down conductors for a height of 6 feet above the ground. Each down conductor shall be terminated at a ground well.

9. Ground wells shall be constructed as indicated on Contract Drawings and shall be equipped with 5/8 inch diameter, 10 foot long solid copper rods. Ground connectors shall be clamped and clamps shall have two bolts. Locate ground well over 2 feet from a structure. Install conductor in rigid conduit where it passes from the structure to the ground well, for physical protection. The ground rod shall extend 10 feet below the finished grade with a minimum of 8 feet in earth or as shown on Drawings.

10. Bond ground medium of all systems together. This shall include lightning protection, electric, telephone, underground metal pipes entering structure, including water, gas, and conduits. Systems already bonded together need not be bonded a second time but a piping system made electrically discontinuous by plastic pipe shall be bonded to make all sections continuous.

11. Provide equipment grounding and bonding connections, sufficiently tight to assure permanent and effective grounds and bonds for lightning protection connection devices as indicated.

12. Provide lightning protection system on structures supporting piping between buildings.

13. Metal objects within a structure shall be bonded to the lighting protection system if they provide a path to ground which is less resistant then the bonding distance.

14. Install arresters as close as practical to the equipment they are protecting.

3.04 FIELD QUALITY CONTROL

A. Tests

1. Upon completion of the installation of the lightning protection system, test resistance-to-ground (earth connection) with a resistance tester. Where tests indicate that the resistance-to-ground is over 5 ohms, take appropriate action to reduce the resistance to one ohm or less, by driving additional, properly spaced, ground rods, and treating the soil in proximity to the ground rods with common salt, copper sulfate or magnesium sulfate. Then retest to demonstrate compliance.

B. Inspection. Verify that the wiring is in accordance with the Contract Drawings and the manufacturer's instructions.

C. Provide three copies of manufacturer's Operational Maintenance Manual.

3.05 MEASUREMENT & PAYMENT

A. No separate payment will be made for work performed under this section. Include the cost of such work in the contract LUMP SUM PRICE.

END OF SECTION

APPENDIX G

OPERATION AND MAINTENANCE MANUAL - OUTLINE

Operations and Maintenance Manual
Fire Fighting Training Area
Removal Action

I. Introduction

1. Purpose
2. Background
    a. Action Memo/Removal Site Evaluation
    b. Removal Action

II. Staging Area

1. Testing
2. Daily Operation
    a. Covering
3. Maintenance
    a. Berm inspection
4. Removal and Transportation
5. Demolition

III. Treatment Operation

1. Initial Spreading
2. Inoculated
3. Intermittent Testing
4. Tilling
5. Watering
6. Closure Testing
7. Removal
8. Gravel Layer Replacement

IV. Treatment Pad Maintenance

1. Berms
2. Roof Structure
3. Access Road
4. Watering System

V. Run-off and Leachate Water

1. Run-off water
    a. Sump maintenance
    b. Submersible pump
2. Leachate Water
    a. Sump maintenance
    b. Submersible pump
3. Storage Tanks
    a. Maintenance
    b. Removal/Disposal of water
    c. Removal of free product

VI. Final Closure

25020101-9408010008

JOB SAFETY AND HEALTH ANALYSIS FORM

JSHA No. 550.F-K Page 1 of 2

DESCRIPTION OF JOB: Steel Support Modifications to Steel Piling at Bldg. 34.	JOB TITLE(S) OF PERSONNEL PERFORMING JOB: Crane Operators Welder/Steel Worker Laborers Site Supervisor	DATE: 10/03/94 ☒ NEW ☐ REVISED
JOB LOCATION: EG&G Mound Fire Training Area.	ANALYZED BY: Deb Flatter F-K Safety	REVIEWED BY: Alan Spesard Operable Unit Manager
REQUIRED AND/OR PROPOSED PERSONAL PROTECTIVE EQUIPMENT: Suspended Personnel Platform, Fall Protection, Hard Hats, Safety Glasses w/Sideshields, Gloves, leathers and welding Helmet.		APPROVED BY: J Wills Sr. Safety Engineer

BREAKDOWN OF BASIC JOB STEPS	POTENTIAL HAZARDS	PROPOSED ACTIONS OR PROCEDURES
Install Support Steel-Using a crane to suspend a work platform into the excavation.	Failure to properly support cage and/or personnel.	Platform and rigging will undergo a trial lift, inspection, and proof test in accordance with 29 CFR 1926.550(g)(5).
	Mis-communication	Pre-lift meeting in accordance with 29 CFR 1926.550(g)(8). Signal person stationed in view of worker and operator.
	Fall from platform	Hoisting of the personnel platform shall be in a slow, controlled, cautious manner. Guardrails and harness anchorages are capable of supporting five times the intended weight. Personnel will tie off to the anchorage.
	Incidental contact, Personnel and Support Steel	Steel will be placed in close proximity to final installation point prior to the personnel platform being positioned.

JOB SAFETY AND HEALTH ANALYSIS FORM
(CONTINUATION SHEET)

JSHA No. 550.F-K Page 2 of 2

BREAKDOWN OF BASIC JOB STEPS	POTENTIAL HAZARDS	PROPOSED ACTIONS OR PROCEDURES
Crane setup and stability.	Unwanted motion of equipment.	The cranes will be setup per manufacturers specifications, stabilized and leveled using pads under the outriggers and cribbing timbers as necessary. Annual and monthly inspection records,as well as, cranes, cables, and rigging will be visually inspected prior to use.
Positioning of steel.	Load slips or drops.	The personnel platform will be positioned away from the work area until steel is roughly positioned. At no time will the personnel platform be positioned below the suspended steel. The trench under the load will not be occupied at any time during this operation.
Welding.	Fire or explosion	Hot work permit will be secured through construction inspection prior to start of work. Fire suppression equip will be close by. Protective clothing shall be worn, a welding hood will be used, and fire suppression equipment will be available.

JOB SAFETY AND HEALTH ANALYSIS FORM

JSHA NO. _____ Page 1 of _____

DESCRIPTION OF JOB: Erect Structural Steel near Bldg. 34.	JOB TITLE(S) OF PERSONNEL PERFORMING JOB: Fryman-Kuck Gen. Contrs., Inc.	DATE: 10-7-94 ☒ NEW ☐ REVISED ORGANIZATION: DEPARTMENT: SUPERVISOR:
JOB LOCATION: EGG Fire Fighting Training Area	ANALYZED BY:	REVIEWED BY:
REQUIRED AND/OR PROPOSED PERSONAL PROTECTIVE EQUIPMENT: Hard Hats, Safety Glass w/Side shields, Fall Protection		APPROVED BY:

BREAKDOWN OF BASIC JOB STEPS	POTENTIAL HAZARDS	PROPOSED ACTIONS OR PROCEDURES
Set Structural Columns & Beams using a crane to place the steel.	Unwanted motion of equipment	The crane, cable, + rigging will be inspected just prior to use. Annual + monthly inspection reports will be available. The crane will be setup using pads under the outriggers and cribbing timbers as necessary to level.
	Steel slipping or falling	Nylon straps will be used to handle the steel. A tag line will be attached to the steel, enabling men on the ground to guide the steel without being under it.

JOB SAFETY AND HEALTH ANALYSIS FORM

JSHA NO. _____ Page 2 of ____

DESCRIPTION OF JOB:	JOB TITLE(S) OF PERSONNEL PERFORMING JOB:	DATE: ☐ NEW ☐ REVISED ORGANIZATION: DEPARTMENT: SUPERVISOR:
JOB LOCATION:	ANALYZED BY:	REVIEWED BY:
REQUIRED AND/OR PROPOSED PERSONAL PROTECTIVE EQUIPMENT:		APPROVED BY:

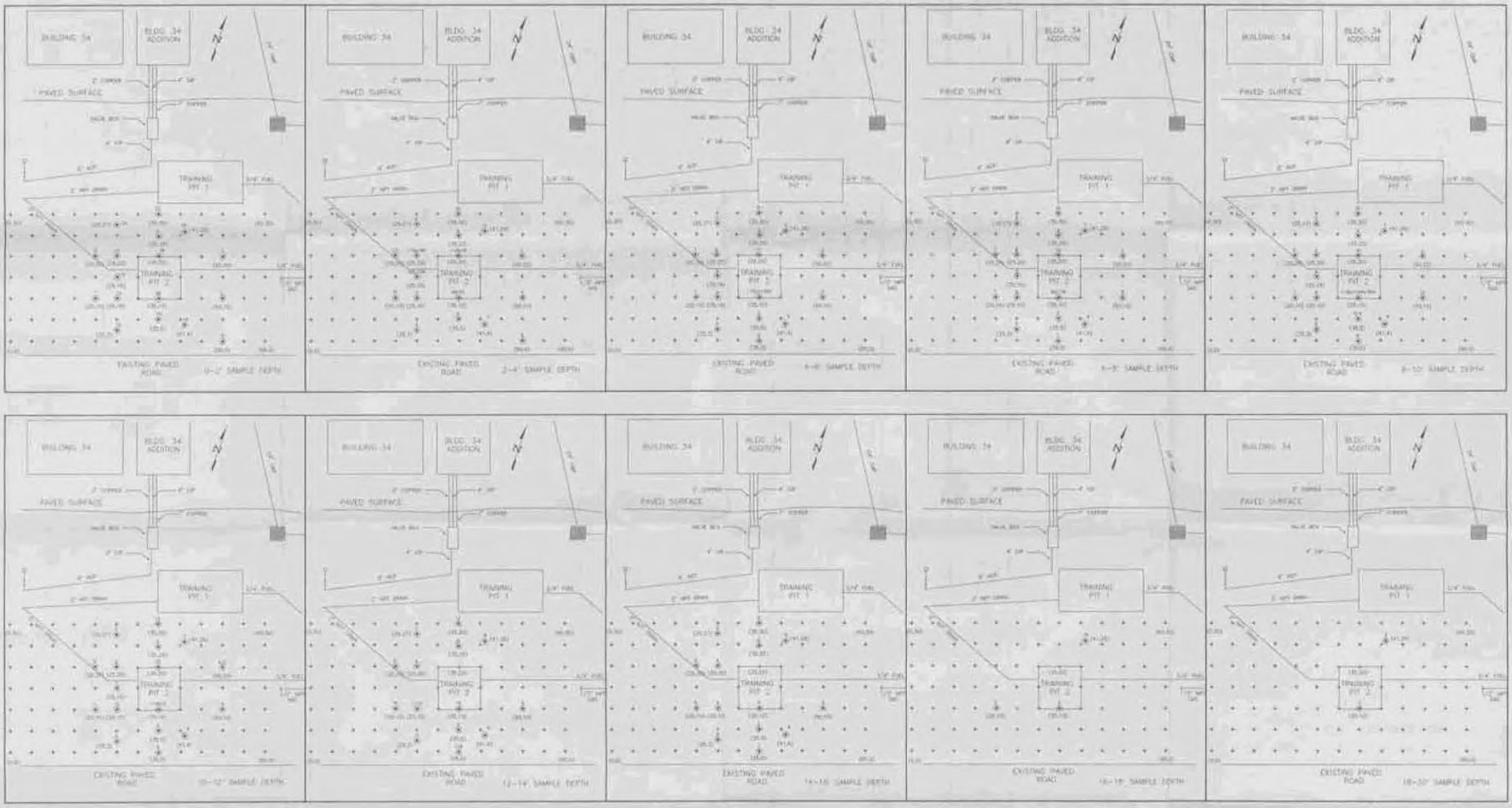
BREAKDOWN OF BASIC JOB STEPS	POTENTIAL HAZARDS	PROPOSED ACTIONS OR PROCEDURES
	Steel slipping or falling ... cont.	A signal man will be stationed so as to be able to see the crane operator and the load at all times. A coordination meeting between the superintendent, crane operator, signal man, ironworkers and laborers will be held to make sure everyone is aware of proper procedures.
Steel connections, column to beams, beam to beam, etc.	Fall during steel erection	The connections will be made using a "snorkel" or "boom" lift. The personnel will be

JOB SAFETY AND HEALTH ANALYSIS FORM

JSHA NO. _____ Page 3 of ____

DESCRIPTION OF JOB:	JOB TITLE(S) OF PERSONNEL PERFORMING JOB:	DATE: ☐ NEW ☐ REVISED ORGANIZATION: DEPARTMENT: SUPERVISOR:
JOB LOCATION:	ANALYZED BY:	REVIEWED BY:
REQUIRED AND/OR PROPOSED PERSONAL PROTECTIVE EQUIPMENT:		APPROVED BY:

BREAKDOWN OF BASIC JOB STEPS	POTENTIAL HAZARDS	PROPOSED ACTIONS OR PROCEDURES
		tied off to the lift.
Install decking or roofing onto structural steel.	Fall during installation	A cable will be run the length of the building and securly attached to the structural steel. Each man will be tied off to this cable.



NOTE:
1. FIELD SCREENING WAS CONDUCTED USING AN OVM-220 (VI. CONTENT ANALYZER (MARCH 1994)
2. SAMPLES WERE TAKEN WITH A GEOPROBE 1" & 2" SAMPLER
3. INVESTIGATION RESULTS ARE EXPRESSED IN PARTS PARTS PER MILLION (P. PETROLEUM HYDRO. CARBONS)

APPROVALS: DATE
SAFETY COMMITTEE REQUIRED
___NONE ___TRNESOC ___TESOC ___ENSOC
TECH. REP. ___
SR. MGR. ___
TRNESOC ___
TESOC ___
ENSOC ___

1	04/94	DRAFT FINAL	RLW
NO.	DATE	REVISION	BY

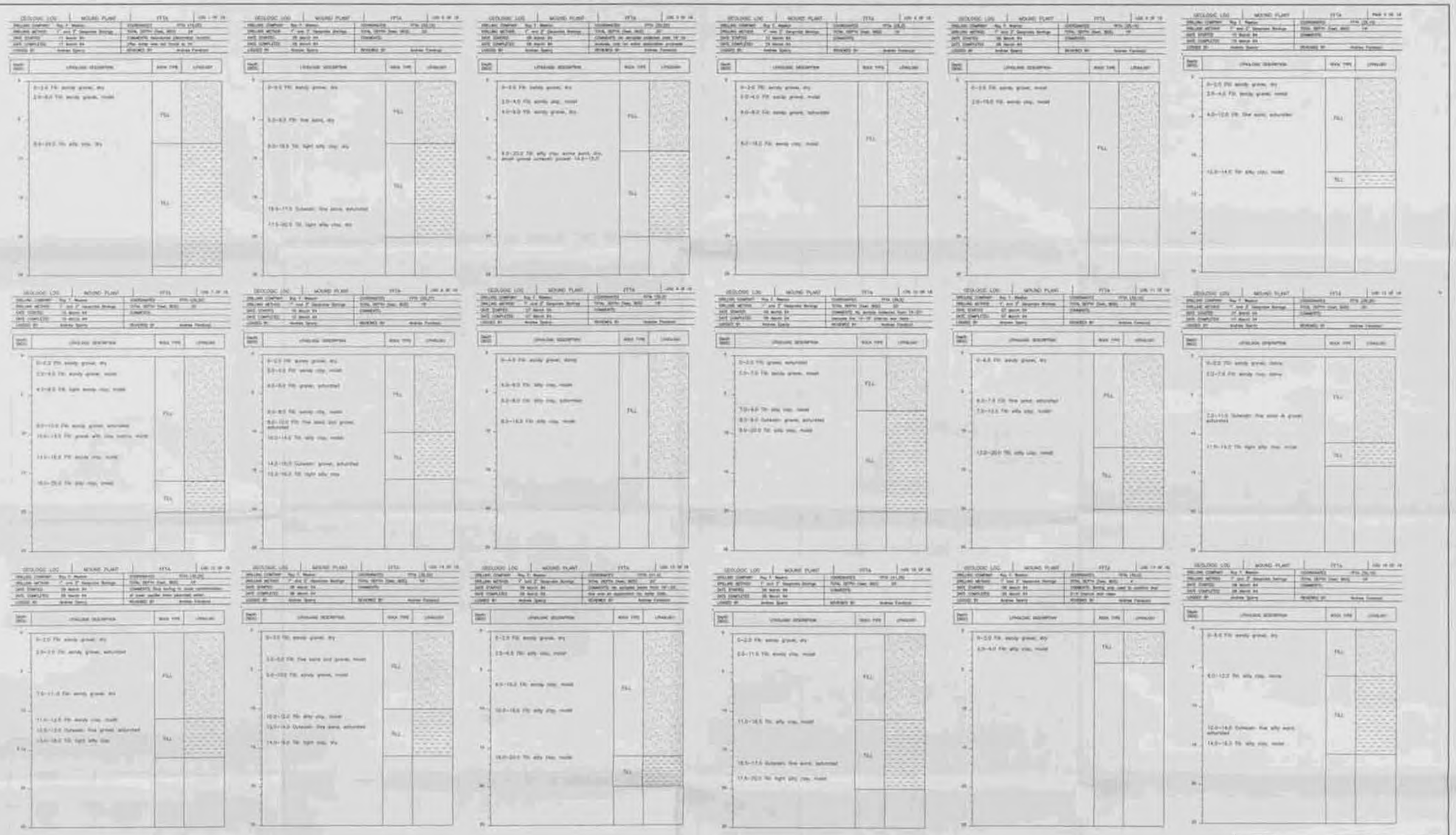
UNITED STATES DEPARTMENT OF ENERGY
MOUND

EX-SITU BIOREMEDIATION TREATMENT SYSTEM

GEOPROBE INVESTIGATION RESULTS

ROY F. WESTON, INC.

01994 04



APPROVALS DATE:
SAFETY COMMITTEE REQUIRED
___NONE ___TRUESOC ___TESOC ___EMSOC
TECH. RESP: _____ _____
SR. MGR: _____ _____
TRUESOC: _____ _____
TESOC: _____ _____
EMSOC: _____ _____

1	5/1/96	DRAFT FINAL	
0	DATE	REVISION	BY

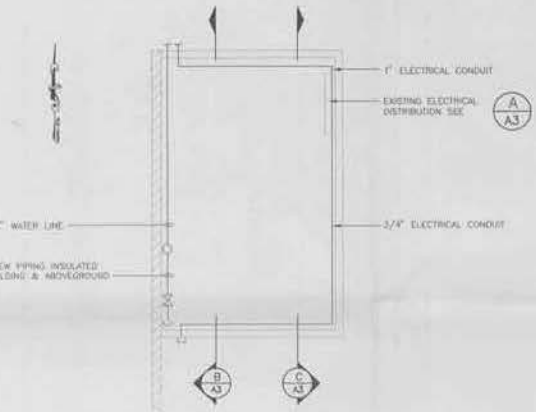
UNITED STATES DEPARTMENT OF ENERGY
MOUND

EX-SITU BIOREMEDIATION TREATMENT SYSTEM

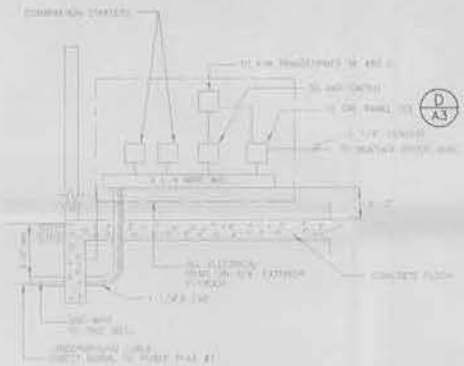
SOIL BORING LOGS

ROY F. WESTON, INC.

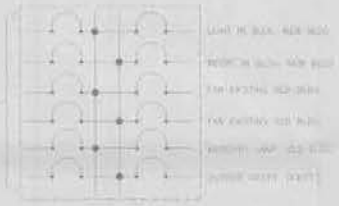
DRAWING NO. 01963 SHEET NO. 03



BUILDING 34 ADDITION UTILITIES 1 A3
N.T.S.



EXISTING DISTRIBUTION PLAN A A3
N.T.S.

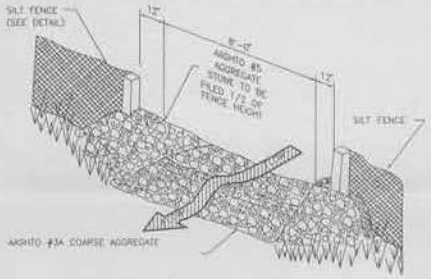


12 PANEL ELECTRIC CIRCUIT PLAN D A3
N.T.S.

- 12 CIRCUIT PANEL BOLTED CIRCUIT BREAKERS, SURFACE MOUNT
- 12 20 AMP BREAKERS

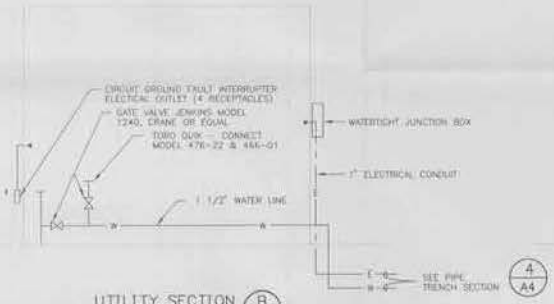
TO BE MODIFIED

NOTE: REPLACE 4 EXISTING SPARE CIRCUIT BREAKERS WITH 4-20 AMP GFI BREAKERS FOR ELECTRICAL SERVICE TO TREATMENT PAD & SUMP; REMAINING 2 SPARE CIRCUIT BREAKERS FOR EXTERIOR RECEPTACLES.

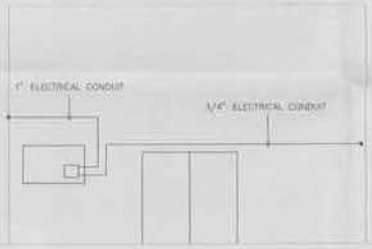


GRAVEL OUTLET DETAIL 2 A3
N.T.S.

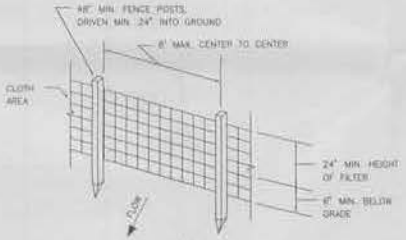
NOTE:
GRAVEL OUTLETS TO BE PROVIDED FOR EVERY 100' OF FENCING (TYPICAL). ALL EXISTING OR GRADED LOW POINTS AND ALL AREAS OF CONCENTRATED FLOWS. CONCENTRATED FLOWS: WHERE THERE IS NO POTENTIAL FOR PONDING OR RUNOFF, THE OUTLET SPACING MAY BE INCREASED.



UTILITY SECTION B A3
N.T.S.



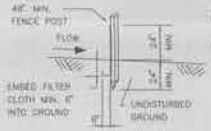
UTILITY SECTION C A3
N.T.S.



TYPICAL SILT FENCE

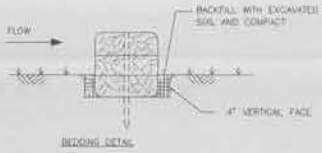
CONSTRUCTION NOTES FOR FABRICATED SILT FENCE

1. THE TOE ANCHOR WILL BE BACKFILLED AND COMPACTED TO A DENSITY EQUAL TO SURROUNDING SOILS.
2. FILTER CLOTH TO BE FASTENED SECURELY TO UPSLOPE SIDE OF FENCE POSTS.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 6" AND STAPLED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

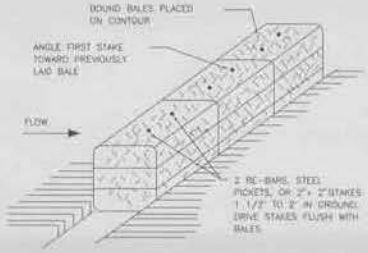


POSTS: STEEL EITHER T OR U TYPE OR 2" HARDWOOD
FILTER CLOTH: AMOCO 1380 SILT STOP OR APPROVED EQUAL

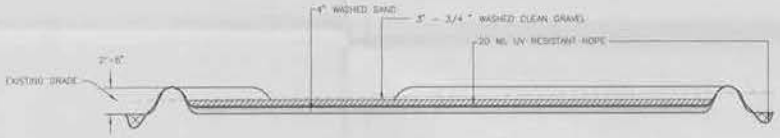
TYPICAL SILT FENCE DETAIL 4 A3
N.T.S.



BEDDING DETAIL



ANCHORING STRAW BALE BARRIER DETAIL 5 A3
N.T.S.



TEMPORARY SOIL STAGING AREA SECTION 3 A3
N.T.S.

APPROVALS:	DATE
SAFETY COMMITTEE REQUIRED:	
___NONE ___TRUESOC ___TESOC ___EMSOC	
TECH. RESP.	
DR. MGR.	
TRUESOC	
TESOC	
EMSOC	

1	4/5/99	DRAFT FINAL	
NO.	DATE	REVISION	BY

UNITED STATES DEPARTMENT OF ENERGY
MOUND

SITE REMEDIATION TREATMENT SYSTEM

CONSTRUCTION DETAILS

ROY F. WESTON, INC.

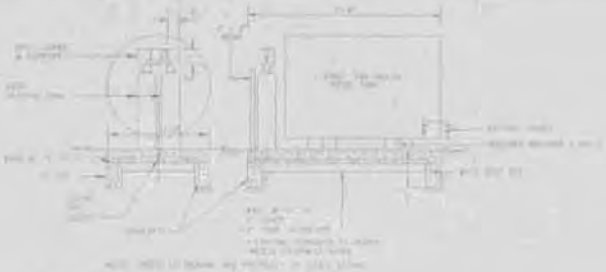
DOBB3 | A3 | 1

JOB NO.

TRAINING PIT DETAIL (TYP.) 1/A4
NTS

TO BE REMOVED

* EXISTING SUBGRADE TO REMAIN UNLESS OTHERWISE NOTED



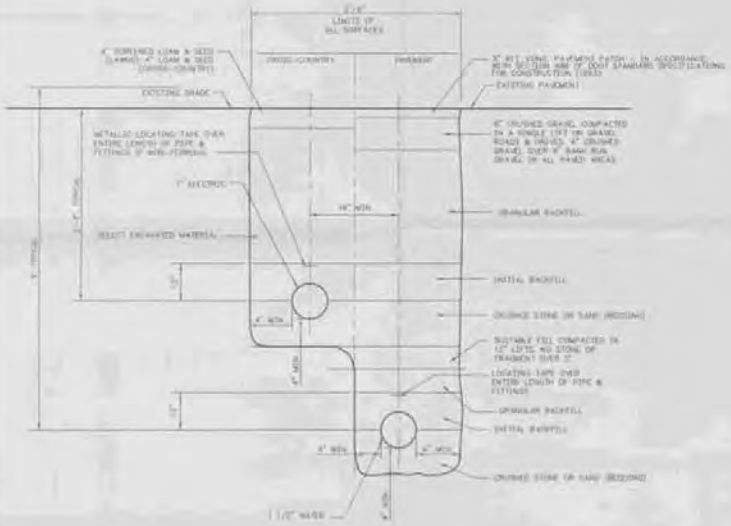
FUEL STORAGE PAD DETAIL 2/A4
NTS

TO BE REMOVED

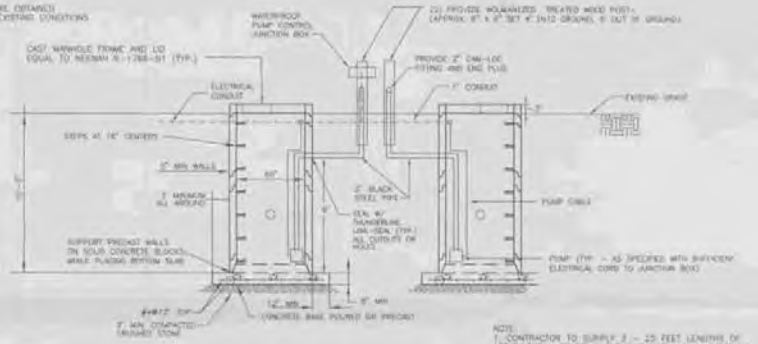
NOTE: ALL "TO BE REMOVED" DETAILS WERE OBTAINED FROM EC & D MOUND DRAWINGS. EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN.

TORCH STAND 3/A4
N.T.S.

TO BE REMOVED

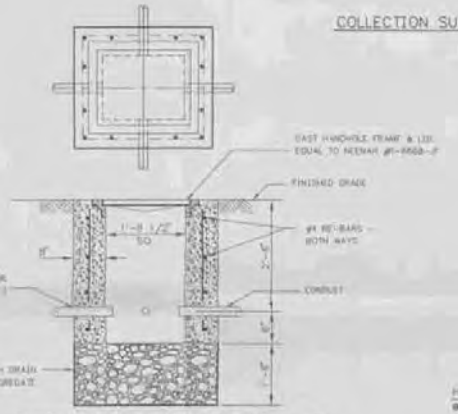


PIPE TRENCH SECTION 4/A4
N.T.S.

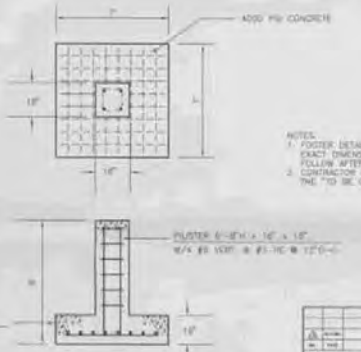


COLLECTION SUMPS SECTION DETAIL 5/A4
N.T.S.

NOTE:
1. CONTRACTOR TO SUPPLY 2 – 25 FEET LENGTHS OF AGRICULTURAL GRADE 3" FLEXIBLE PIPE W/ MALE/FEMALE CAM-LOC FITTINGS TO REMAIN PROPERTY OF EUNS MOUND FOR USE WITH SUMPS.



TYPICAL WIRE PULLING HANDHOLE 6/A4
NTS



NOTES:
1. FOOTER DETAIL IS FOR ESTIMATION PURPOSES ONLY. EXACT DIMENSIONS AND SIZE, SPACING OF REBAR WILL FOLLOW AFTER AWARD OF CONTRACT.
2. CONTRACTOR IS TO ASSUME FOR BIDDING THAT THIS IS THE "TO BE CONSTRUCTED" FOOTER.

FOOTER SECTION & PLAN DETAIL 7/A4
N.T.S.

APPROVALS: DATE
SAFETY COMMITTEE REQUIRED
___HOME ___TRUCKS/C ___TESC ___EMSC
TECH. REP OF WORK
TRUCKS/C
TESC
EMSC

1	DRAFT FINAL		
0	ISSUED		

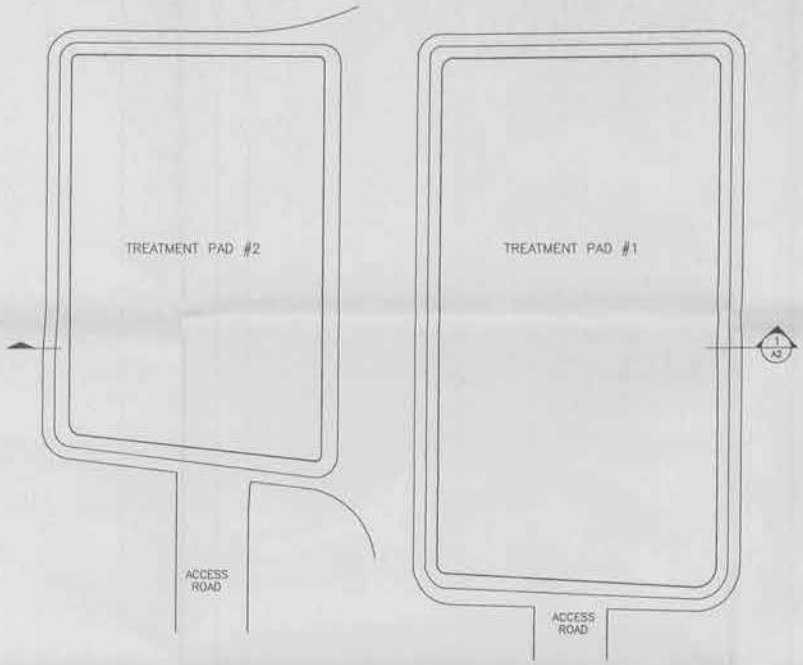
UNITED STATES DEPARTMENT OF ENERGY

EX-SITU BIOREMEDIATION TREATMENT SYSTEM

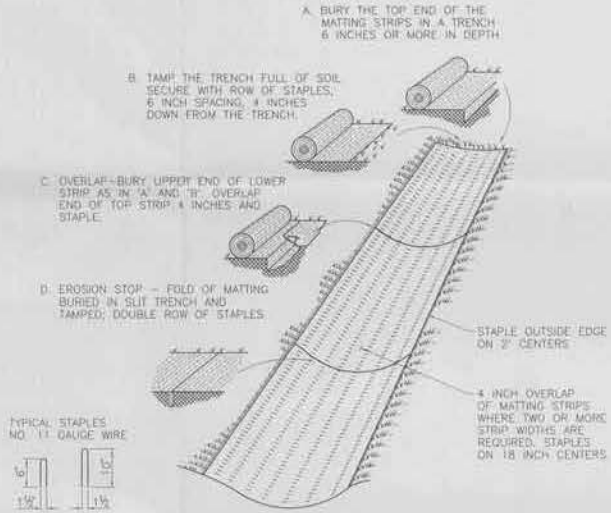
CONSTRUCTION DETAILS

RUST E. MESTON, INC.

A4

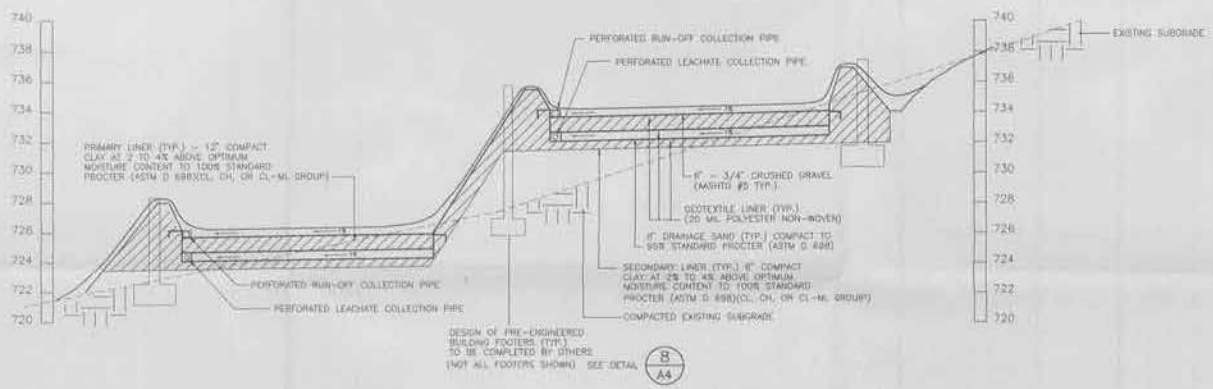


PAD PLAN

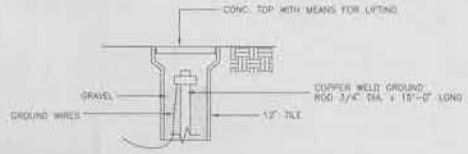


DETAIL FOR STABILIZING WATERWAYS WITH JUTE OR EXCELSIOR MATTINGS (2/A2)

N.T.S.



PAD SECTION (1/A2)



TYPICAL GROUNDING WELL DETAIL (3/A2)

N.T.S.

APPROVALS: DATE:

SAFETY COMMITTEE REQUIRED:

___NONE ___TRUESOC ___TESOC ___EMSOC

TECH. RESP. _____

DR. MGR. _____

TRUESOC _____

TESOC _____

EMSOC _____

1	8/7/96	DRAFT FINAL
NO.	DATE	REVISION

UNITED STATES DEPARTMENT OF ENERGY

MOUND

EX-SITU BIOREMEDIATION TREATMENT SYSTEM

TREATMENT PADS PLAN & SECTION

1" = 30'

8/7/96

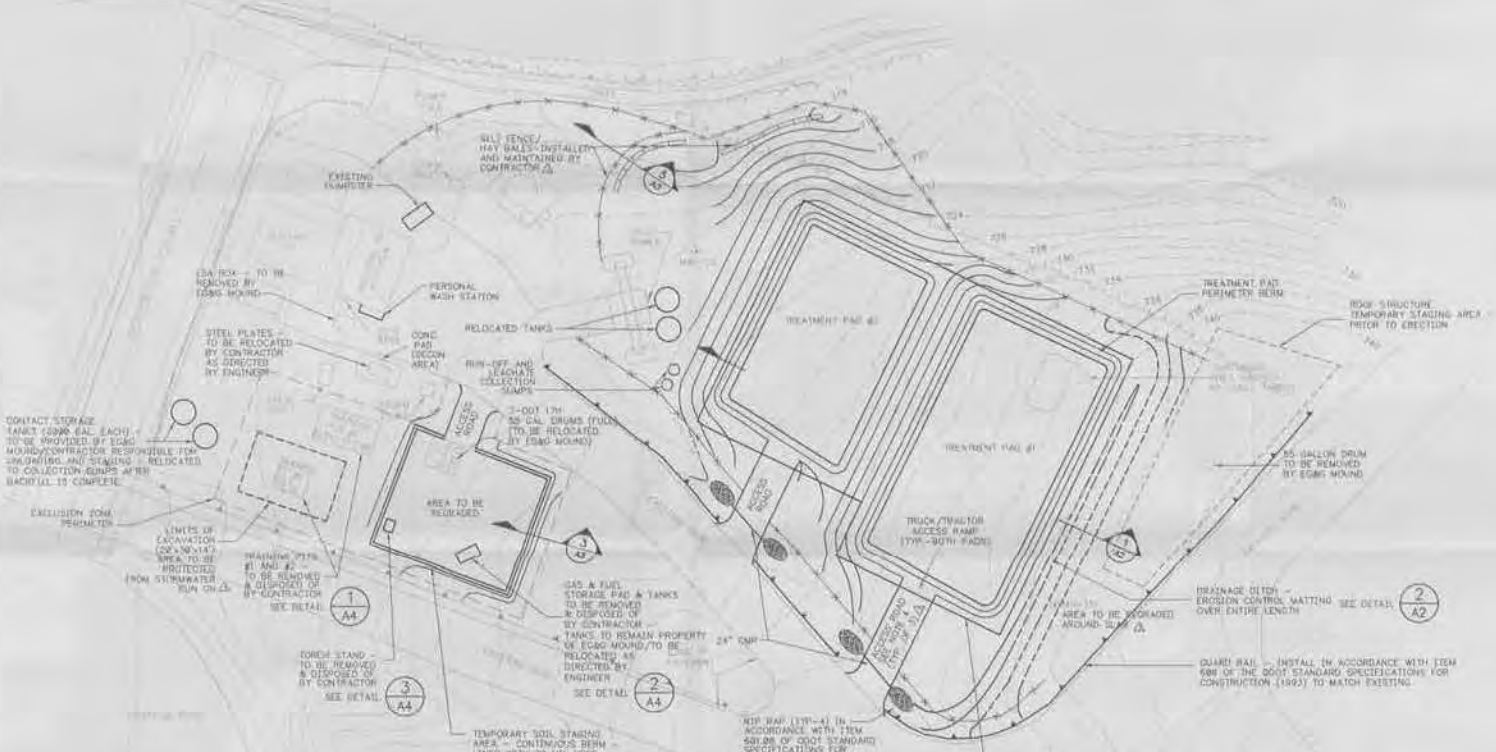
ROY F. WESTON, INC.

R3083

A2

1

OLD U.S. ROUTE 35
CONRAIL RAILROAD
CONRAIL RAILROAD
SPOILS AREA
ACCESS ROAD
BUILDING 14 FETA WORK AREA
STEEP GRADE
BENNER ROAD
CONTRACTOR'S GATE HOURS: 0630 - 1800
CONTRACTORS PARKING
BUILDING 4 MOUND SAFETY ORIENTATION
GUARD POST 2 BADGE PICK-UP
GUARD HOUSE #5 PICK-UP GUARD ESCORT
MAIN ENTRANCE ROAD
MOUND ROAD
GATE 10 KGAG EMPLOYEES EXIT
GATE 9 VENDOR EXIT
GUARD HOUSE BADGE PICK-UP
GATE 8 KGAG EMPLOYEES
GATE 7 VENDOR AND CONTRACTOR DELIVERIES TO BE USED FOR HEAVY EQUIPMENT - DRIVER DOES NOT NEED ORIENTATION TRAINING IF REMAINS IN VEHICLE
PLANT
25°30'46.5"
TRUE
SCALE
50 0 100 200 300
MOUND MAP SOURCE DRAWING #SCN09413
ORIGIN MD-0813-V3.0
APPROVALS
SAFETY COMMITTEE REQUIRED
NWM TRUESOC RISOC EMSOC
TECH. RESP
SR. MGR
TRUESOC
RISOC
EMSOC
DATE
DRAFT FINAL
UNITED STATES DEPARTMENT OF ENERGY
MOUND
XY-SITU BIOREMEDIATION TREATMENT SYSTEM
CONTRACTOR'S ROUTE SHEET
ROY F. WESTON, INC.



NOTES:

1. CONTRACTOR IS TO ALLOW FOR 24-HOUR UNRESTRICTED ACCESS ON ALL EXISTING ROADWAYS.
2. CONTRACTOR IS RESPONSIBLE FOR ROADWAY AND GUARDRAIL INTEGRITY DUE TO EXCAVATION.
3. CONTRACTOR IS TO PROVIDE HIGH VISIBILITY FENCING TO RESTRICT ACCESS DURING SITE OPERATIONS.
4. ALL ACCESS ROADS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SECTION 209 OF THE ODOT STANDARD SPECIFICATIONS FOR CONSTRUCTION - 1993.

APPROVALS:	DATE:
SAFETY COMMITTEE REQUIRED:	
NONE TRUESOC TESOC ENGOC	
TECH. RESP.	4/2/04
DR. MGR.	
TRUESOC	
TESOC	
ENGOC	4/1/04

1	4/2/04	DRAFT FINAL	
NO.	DATE	REVISIONS	BY

UNITED STATES DEPARTMENT OF ENERGY

EG&G

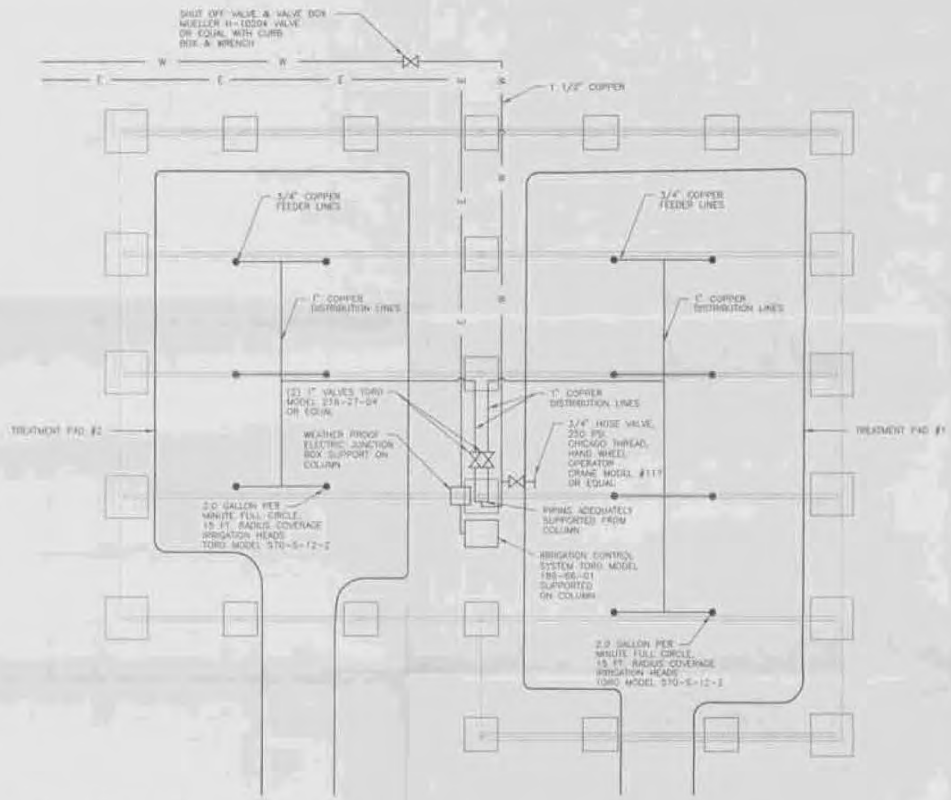
EX-SITU BIOREMEDIATION TREATMENT SYSTEM

SITE AND EROSION AND SEDIMENT CONTROL PLAN

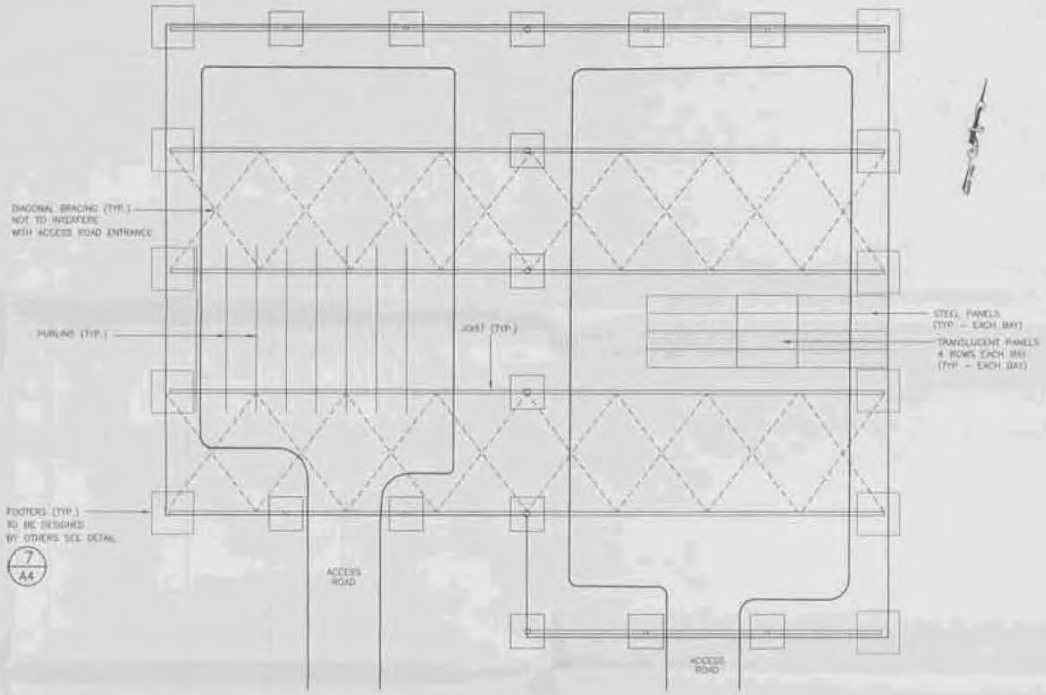
ROY F. WESTON, INC.

DRAWING NO. 01-0001

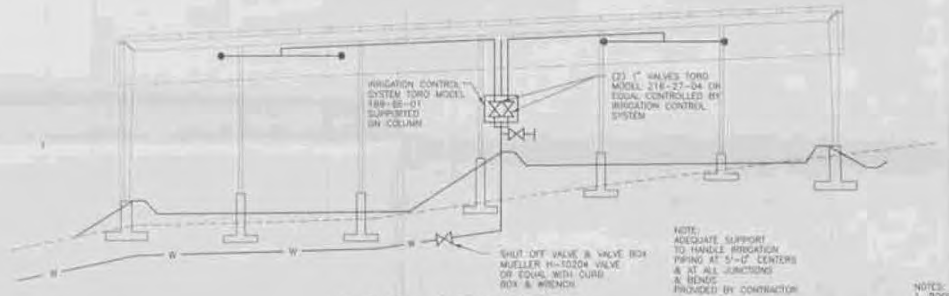
SHEET NO. 1 OF 1



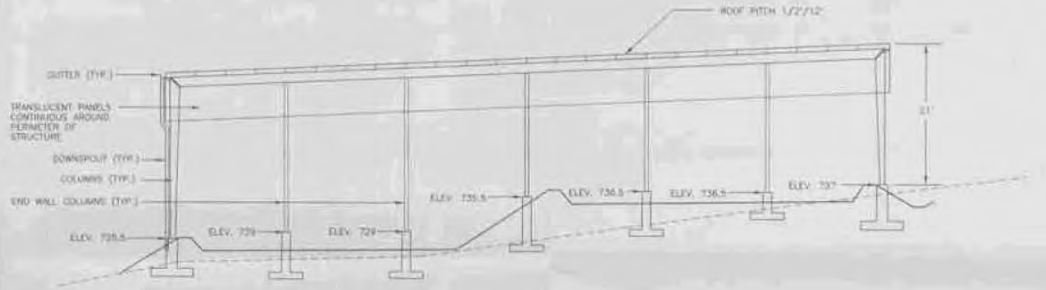
IRRIGATION SYSTEM PLAN



ROOF PLAN



IRRIGATION SYSTEM SECTION



ROOF SECTION

NOTES:
1. ROOF STRUCTURE TO BE PROVIDED ON SITE BY ENGINEER. CONTRACTOR RESPONSIBLE FOR UNLOADING & STORAGE PRIOR TO ERECTION.
2. ROOF STRUCTURE, FOOTING & ASSOCIATED HARDWARE ARE TO BE INSTALLED BY CONTRACTOR.
3. STRUCTURE & ASSOCIATED HARDWARE IS TO BE PAINTED BY CONTRACTOR PER MANUFACTURES SPECIFICATIONS.
4. PIPING SHOWN SCHEMATICALLY. CONTRACTOR TO SUBMIT LAYOUT DRAWING.

APPROVALS: DATE:
SAFETY COMMITTEE REQUIRED
___NONE ___TRUESOC ___TESOC ___EMSOC
TECH. REVIEW
OR. MGR.
TRUESOC
TESOC
EMSOC

1	DRAFT FINAL	
NO.	REVISION	

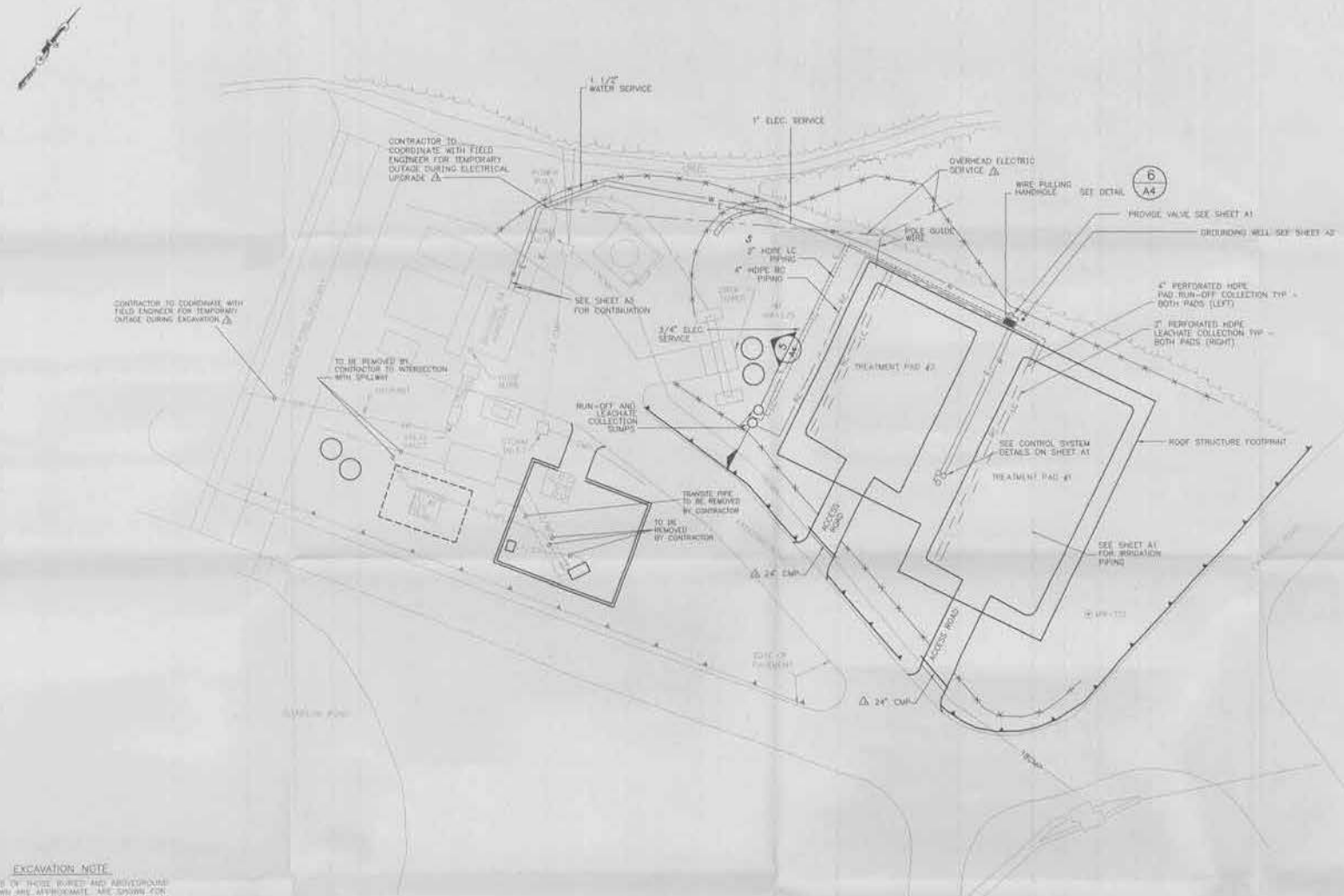
UNITED STATES DEPARTMENT OF ENERGY
MOUND

EX-SITU REMEDIATION TREATMENT SYSTEM

ROOF & IRRIGATION PLAN, SECTION & DETAILS

ROY F. WESTON, INC.

DRAWING NO. R2N87 SHEET 1 REV. 1



EXCAVATION NOTE

THE LOCATIONS OF THOSE BURIED AND ABOVEGROUND UTILITIES SHOWN ARE APPROXIMATE, ARE SHOWN FOR CONTRACTOR INFORMATIONAL USE ONLY, AND ARE NOT TO BE REFERENCED FOR CONSTRUCTION PURPOSES. THE IMPLIED PRESENCE OR ABSENCE OF UTILITIES IS NOT TO BE CONSTRUED BY EG&G MOUND, THE ENGINEER, CONTRACTOR OR SUBCONTRACTORS TO BE AN ACCURATE AND COMPLETE REPRESENTATION OF UTILITIES THAT MAY OR MAY NOT EXIST ON THE CONSTRUCTION SITE. AN EXCAVATION PERMIT FROM MOUND IS REQUIRED PRIOR TO ANY EXCAVATION. BURIED AND ABOVEGROUND UTILITY LOCATION, IDENTIFICATION, AND MARKING ARE THE RESPONSIBILITY OF EG&G MOUND. REROUTING, DISCONNECTION, PROTECTION, ETC. OF ANY UTILITIES MUST BE COORDINATED BETWEEN THE CONTRACTOR, EG&G MOUND AND ENGINEER. SITE SAFETY, INCLUDING FOLLOWING THE FIRE FIGHTING TRAINING AREA SITE HEALTH AND SAFETY PLAN, OSHA REGULATIONS AND HAZARDS ASSOCIATED WITH BURIED AND ABOVEGROUND UTILITIES, REMAIN THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

NOTES:
1. VERIFICATION OF UTILITY LOCATION BY CONTRACTOR WITH ENGINEER & EG&G MOUND BEFORE UTILITIES ARE REMOVED.
2. ALL DISTURBED AREAS SHALL ALL BE PERMANENTLY STABILIZED (I.E. SEEDED) WITHIN 5 DAYS OF COMPLETION OF WORK.

APPROVALS:	DATE:
SAFETY COMMITTEE REQUIRED: ___NONE ___TRUESOC ___TESOC ___EMSOC	
TECH. RESP.	
SR. MGR.	
TRUESOC	
TESOC	
EMSOC	

1	8/7/95	DRAFT FINAL	
NO.	DATE	REVISION	BY

UNITED STATES DEPARTMENT OF ENERGY
MOUND

PROJECT TITLE: EX-SITU BIOREMEDIATION TREATMENT SYSTEM

DRAWING TITLE: UTILITIES PLAN

ROY F. WESTON, INC.

DRAWING NO. 01B02 02

EG&G MOUND APPLIED TECHNOLOGIES

FIRE FIGHTING TRAINING AREA REMOVAL ACTION

EX-SITU BIOREMEDIATION TREATMENT SYSTEM

MIAMISBURG, OHIO

JUNE 1994

INDEX

ARX TITLE SHEET
G1 SITE AND EROSION AND SEDIMENT CONTROL
G2 UTILITIES PLAN
A1 ROOF AND IRRIGATION PLAN, SECTION AND DETAILS
A2 TREATMENT PADS PLAN AND SECTION
A3 CONSTRUCTION DETAILS
A4 CONSTRUCTION DETAILS
G3 SOIL BORING LOGS
G4 GEOPROBE INVESTIGATION RESULTS
G5 CONTRACTORS ROUTE SHEET

LEGEND

- TREELINE
- SILT FENCE
- GUARDRAIL
- W — WATER LINE
- E — ELECTRICAL LINE
- CMP — CORRUGATED METAL PIPE
- RC — RUN-OFF COLLECTION PIPELINE
- RC — PERFORATED RUN-OFF COLLECTION PIPING
- LC — LEACHATE COLLECTION PIPELINE
- LC — PERFORATED LEACHATE COLLECTION/ LEAK DETECTION PIPING
- SZ — STORM SEWER
- FL — FUEL LINE
- G — GAS LINE
- OVERHEAD ELECTRIC LINE
- EXISTING CONTOUR LINES
- NEW CONTOUR LINES
- EP — ELECTRIC POLE
- CONC — CONCRETE
- DECON — DECONTAMINATION
- DOT — DEPARTMENT OF TRANSPORTATION
- GAL — GALLON(S)
- HDPE — HIGH DENSITY POLYETHYLENE
- LSA — LOW SPECIFICATION ACTIVITY
- NTS — NOT TO SCALE
- O.C. — ON CENTER
- TYP — TYPICAL
- UV — ULTRAVIOLET

1/7 — DETAIL NUMBER / DETAIL CALL OUT / DETAIL LOCATED ON THIS DRAWING

NOTES:
1. ALL BOLD ITEMS ARE TO BE CONSTRUCTED BY CONTRACTOR UNLESS OTHERWISE NOTED.
2. ALL LIGHT SHADED ITEMS ARE EXISTING FEATURES UNLESS OTHERWISE NOTED.
3. CONTOUR INTERVAL = 2 FEET