4-205.1

134 ~~4-402.1~~

SITE PREPARATION/UNDERGROUND UTILITIES FERNALD RESIDUES VITRIFICATION PLAN PERFORMANCE SPECIFICATIONS

08/00/95

PARSONS DOE-FN

~~200~~ 118

REPORT

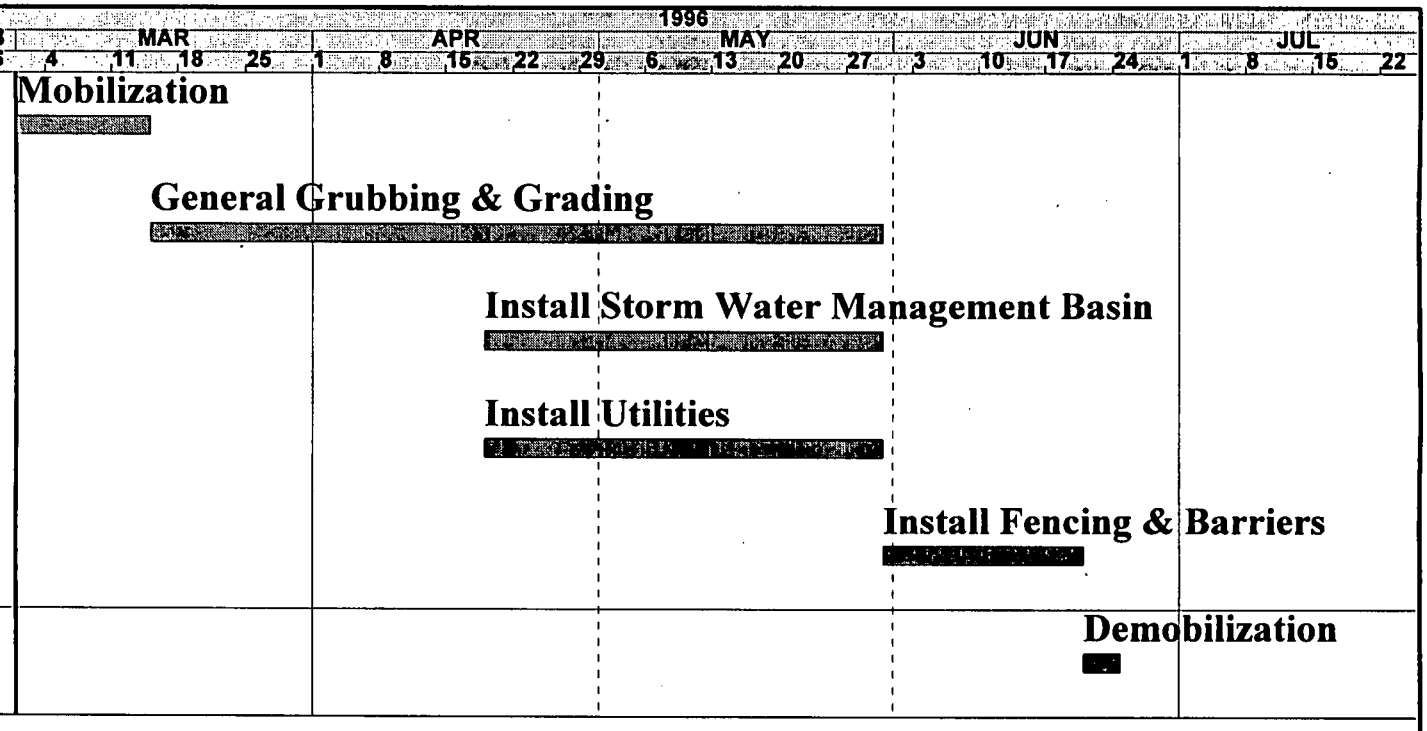
Site Preparation/Underground Utilities
Fernald Residues Vitrification Plant
Performance Specifications

Operable Unit 4
Project Order 146
WBS No. 1.1.1.1.4.3
August 1995
Revision A

Environmental Remedial Action Project
Fernald Environmental Management Project
Fernald, Ohio
FERMCO Subcontract No. 2-21487

Fairfield Executive Center
6120 South Gilmore Road
Fairfield, Ohio 45014

Early start	Early Finish	Duration Work Days
01MAR96	14MAR96	10
15MAR96	30MAY96	55
19APR96	30MAY96	30
19APR96	30MAY96	30
31MAY96	20JUN96	15
21JUN96	24JUN96	2



Project Start	01MAR96
Project Finish	24JUN96
Data Date	01MAR96
Plot Date	30AUG95

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Early Bar
Progress Bar
Critical Activity

SPUU

FERMCO / Dept of Energy
SP/UU Pre-final Const Schedule
For Informational Purposes

Sheet 1 of 1

U.S. DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERMCO SUBCONTRACT NO. 2-21487

PROJECT ORDER 146
WBS NO. 1.1.1.1.4.3
PERFORMANCE SPECIFICATIONS
SECTION 00003
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END OF SECTION

SECTION 01010
GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE

These general requirements form a part of all the technical divisions of these specifications.

PARSONS has prepared these specifications. In all cases where the words "A/E Subcontractor" appear in these specifications, it shall be understood to refer to PARSONS or to such other individuals or organizations acting within the scope of the specific duties entrusted to them.

In all cases where the terms "Vendor" or "Seller" or "Manufacturer" or similar terms appear in these specifications or in the appendices to these specifications, they shall be understood to refer to an individual or firm(s) providing materials, equipment, or services, as noted, under a subcontract to Fernald Environmental Restoration Management Corporation (FERMCO).

In all cases where the term "Subcontractor" appears in these specifications, it shall be understood to refer to the Construction Contractor or Subcontractor.

In all cases where the words "Owner's Agent" or "Construction Manager" appear, they shall be understood to refer to FERMCO.

The Subcontractor shall perform all construction acceptance tests as coordinated and supervised by FERMCO. In addition, before the final acceptance of the work, the Subcontractor shall perform an integrated system construction acceptance test as coordinated and supervised by FERMCO.

The Subcontractor shall provide written procedures for FERMCO's review and approval of all tests to be performed as identified in the drawings and specifications. These procedures shall provide detailed step-by-step operations with sign-off columns and shall be submitted and approved prior to testing.

Generally, all field test instruments shall have been calibrated, within 12 months prior to use on this subcontract, by a calibration laboratory whose calibration equipment and instruments are fully traceable to National Institute of Science and Technology (NIST) standards. The Subcontractor shall provide individual certification of calibration and NIST standards traceability for all field test instruments used on this subcontract.

All work shall be accomplished in accordance with the following code requirements:

A. Ohio Basic Building Code (OBBC) 1995.

B. Uniform Building Code (UBC) 1994.

C. Code for Safety to Life from Fire in Buildings and Structures (NFPA 101, Life Safety Code) - 1994.

D. All other National Fire Protection Association (NFPA) Codes - All inclusive, including 1995 revisions.

1.2 SITE AND SCOPE

The intent of these specifications is to provide all work required and necessary to provide site work and underground utilities for site preparation/underground utilities.

The Subcontractor shall provide all labor, services, materials, and equipment, and shall do all work necessary to accomplish this within the limits of work as defined in the accepted bid and/or contract.

1.3 LISTS OF MATERIALS, MANUFACTURERS, OR EQUIPMENT SUPPLIERS

A. The listing of materials, equipment, manufacturers' names, or equipment suppliers in these specifications in no way precludes the offerer from proposing alternate materials, equipment, manufacturers' names, or equipment suppliers of any of the items to be furnished within the scope of these specifications. These lists are intended to identify the types and

general quality of those items that will be included in the offerer's proposal. It is the offerer's responsibility to propose the materials, manufacturers' names, or equipment that is best suited for this project in combined terms of quality and price.

1.4 SUBMITTALS - SHOP DRAWINGS, SAMPLES, AND OTHER DATA

A. Refer to Part 6, Statement of Work, in the Invitation for Bid for submittal requirements as listed on the Documentation Requirements Form. Any submittals not in conformance with these requirements will be returned without review for correction and resubmittal:

1. Submittals for unrelated items shall not be included in the same transmittal, and each separate submittal shall be coordinated and shall include all drawings and data required for the item or system covered.
2. Submittals shall indicate project name; identification by specification division, section, subsection, and article under which equipment or material is described; and by name, number, and intended use as designated by contract drawings and specifications. Each submittal, if required by the specification, shall contain certificates of conformance for all items, certifying that the materials and equipment specified meet contract requirements.
3. When more than one item of equipment is included on a single drawing or catalog cut, each project equipment item must be separately identified thereon, with clear delineation as to which model or catalog number, or performance data applies to each project item.
4. Assemble and submit, if required, in logically arranged folders, the following:
   a. All instruction bulletins, diagrams, lubrication schedules, operating instructions, parts lists, and pamphlets for equipment and apparatus furnished, including vendor's or manufacturer's recommended procedure for lifting, handling, and installing equipment.

5. Submittals for equipment shall include manufacturer's catalog "cut sheets" or similar information bulletins indicating the model number or catalog number, ratings, size, weight, and performance curves and data. Indicate operating point on curves and tabular data for each piece of equipment that curves or data represent.
6. Submit wiring diagrams or connection diagrams for equipment items, accompanied by adequately defined symbols list. Schematic and wiring diagrams must be prepared in accordance with ANSI/IEEE Publication Y32E, "Electrical and Electronics Graphics Symbols and Reference Designations." Individual 8-1/2 by 11-inch elementary and wiring drawings are not acceptable.
7. Indicate all performance data, construction material finishes, and modifications to manufacturer's standard design specified.
8. Locate termination points for all required external wiring.
9. Indicate roughing-in, foundation, and support point dimensions.
10. Submit written test procedures for all required testing. Include criteria for acceptable performance. Submit test reports after completion of tests.
11. Submit Material Safety Data Sheets (MSDSs), if required, for all cutting oils, caulks, sealants, lubricants, paints, etc., and all other similar compounds.
12. The A/E Subcontractor's review of such submittals shall not relieve the Subcontractor from any responsibility for deviations from contract drawings or specifications, unless the Subcontractor has in writing called the A/E Subcontractor's attention to such deviations at the time of submission, nor shall it relieve the Subcontractor from responsibility for errors of any sort in the submittals nor from responsibility for the proper fitting and construction of the work.
13. Submittals will be reviewed with respect to such factors as quality of draftsmanship, legibility,

and evidence that the Subcontractor is aware of the necessity and importance of adequately detailing and illustrating special features and conditions relating to the work. If the A/E Subcontractor determines that the data submitted, in part or in whole, is not within the purview of the A/E Subcontractor's review, such submittal, or part thereof, will be returned to FERMCO unchecked. Dimensions, sizes, construction details, and directive notes shown will be reviewed for accuracy, compliance with the specifications, adequacy, interferences, etc., on a spot check or incomplete basis to establish that the Subcontractor has given such factors careful attention.

14. Any changes marked on submittals during review will be for the purpose of indicating the requirements of the contract documents, and no change in the contract amount is authorized by such markings.
15. When submittals are found to be satisfactory with respect to the above factors and within the scope of the review outlined above, they will be returned by FERMCO to the Subcontractor bearing certificate attachment permitting the Subcontractor to employ them in the furtherance of the Subcontractor's work under the contract, but only with the express understanding that such permission shall not relieve the Subcontractor of the responsibilities for the full performance of the work required under the contract in conformance with the contract documents governing such performance, nor for any other deficiencies in the submittals such as inaccuracies, discrepancies, omissions, interferences in the work itself, or with the work of other contractors, whether or not such deficiencies were observed or noted in the course of the review of the shop drawings.
16. The Subcontractor shall verify all field dimensions required for shop drawings.

B. Submittal Requirements: Submittals required include drawings and/or data for all items listed below; refer to Attachment 1 of this specification section:

1. "AA" designates that shop drawings and pertinent performance data and curves are required.
2. "BB" designates that catalog data and pertinent performance data and curves are required.
3. "CC" designates that these items are to be included on a listing giving the manufacturer and a brief type description for each item. Such listing shall be submitted after notice to proceed, unless noted otherwise by FERMCO. Note that shop drawings or catalog data may also be required for items included on this list.
4. "DD" designates that samples of finishes are required with full range of color choices and/or patterns submitted.
5. "EE" designates that physical samples of materials are required.
6. "FF" designates that individual certifications for conformity to qualifications and standards specified are required. For equipment items, this indicates that certified equipment drawings are to be submitted.
7. "GG" designates that the technical specifications contain specific submittal requirements.
8. "HH" designates that engineering calculations are required.
9. "II" designates that spare parts list is required.
10. "JJ" designates that an installation, operation, and maintenance manual is required.
11. "KK" indicates that manufacturer's material safety data sheets are required.
12. "LL" indicates that test reports are required for tests noted in the technical specifications.
13. "MM" indicates that wiring diagrams for power, signal, and control wiring are required.
14. "NN" indicates that schematic piping diagrams, with sizes and components shown, are required.

1.5 OPERATING MANUALS AND SPARE PARTS LISTS

A. Copies of a priced recommended spare parts list shall be submitted prior to the shipment of any item of equipment.

B. An Installation, Operation, and Maintenance (IOM) Manual shall be prepared so as to provide optimum operation and maintenance of the equipment and systems being furnished.

C. The cover of the IOM Manual shall include the following information:
1. Project Title -
2. WBS No. -
3. A/E Subcontractor - PARSONS.
4. Construction Manager - FERMCO.
5. Subcontractor (Name of Subcontractor, if any).

D. The IOM Manuals shall be bound into one or more volumes for ease of handling and shall have an index. The manual shall include descriptive literature, drawings, performance curves and rating data, test reports, and spare parts lists. The maintenance section shall divide maintenance procedures into two categories, "Preventive Maintenance" and "Corrective Maintenance," and a subsection for "Safety Precautions." Preventive maintenance shall include cleaning and adjustment instructions. Corrective Maintenance shall include instructions and data arranged in the normal sequence of corrective maintenance (i.e., troubleshooting) (logical effect to cause), then repair and replacement of parts, then the parts list. Safety Precautions shall comprise a list of safety precautions and instructions to be followed before, during, and after making repairs, adjustments, or routine maintenance.

E. Submit complete sets of final, approved manuals prior to the shipment of the equipment or system.

1.6 SPECIFICATION EXPLANATION

A. General: The technical specifications are of the abbreviated, simplified, or streamlined type and include incomplete sentences. Omissions of words or phrases such as "the contractor shall," "in conformity therewith," "shall be," "as noted on the drawings," "according to the plans," "a," "the," and "all" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the drawings.

The Subcontractor shall provide all items, articles, materials, operations, or methods listed, mentioned, or scheduled either on the drawings, or specified herein, or both, including all labor, materials, equipment, and incidentals necessary and required for their completion and installation.

For convenience of reference and to facilitate the letting of contracts, the specifications may be separated into titled divisions. Such separations, however, shall not operate to make the engineer an arbitrator to establish the limits of subcontracts in any manner. The following defines the separations referred to in the specifications.

1. Division: Separate numbered division of specifications (e.g., Div. 16)
2. Section: Separate numbered section of a division (e.g., Sec. 16020)
3. Article: Separate numbered article of a subsection (e.g., Article 2.1)

B. Definitions: Certain terms and words as used throughout the specifications shall be defined as follows, unless otherwise particularly specified:

1. "Provide": Furnish and install, complete, in place.
2. "Indicated": As shown on the drawings and/or specified.

3. "Directed," "Authorized," "Permitted": Shall be as directed, authorized, or permitted by FERMCO.
4. "Selected": Shall be as selected by the A-E/Subcontractor or FERMCO.
5. "Satisfactory," "Acceptable": Satisfactory or acceptable to FERMCO.
6. "Necessary," "Required," "Suitable": As necessary, required, or suitable for the intended purpose as determined by FERMCO.
7. "Submit": Submit to FERMCO unless otherwise specified.

In all cases where the words "or equal" appear in these specifications, they shall be understood to mean "or approved equal."

1.7 ABBREVIATIONS FOR REFERENCED STANDARDS AND SPECIFICATIONS

A. The following list denotes abbreviations used in the technical portions of these specifications:

Abbreviation	Authority
AASHTO	American Association of State Highway and Transportation Officials.
ACI	American Concrete Institute
ADC	Air Diffusion Council
AGC	Associated General Contractors of America
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute

Abbreviation	Authority
APA	American Plywood Association
ARI	Air Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CFR	Code of Federal Regulations
DHI	Door and Hardware Institute
FGMA	Flat Glass Marketing Association
FM	Factory Mutual System
GA	Gypsum Association
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronics Engineers
IMIAC	International Masonry Industry All-Weather Council
MBMA	Metal Building Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute of Science and Technology
NPCA	National Paint and Coatings Association
ODOT	Ohio Department of Transportation
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute

Abbreviation	Authority
PDCA	Painting and Decorating Contractors of America
PS	United States Department of Commerce, Voluntary Products Standards
SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
UL	Underwriters Laboratories, Inc.

1.8 WARRANTIES

A. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

B. Refer to FERMCO's "General Terms and Conditions," in the Invitation for Bid.

END OF SECTION

PARSONS
ERA PROJECT

Attachment 1 to Section 01100 of Specifications
Submittal Listing
Division 2

Material/Equipment/Item/ Description	Shop Dwgs A	Cat/ Curves B	List Only C	Fin Smpl D	Phys Smpl E	Mat/Per Certif F	Tech Specs G	Eng'g Calcs H	Parts List I	IOM Mnls J	M.S. D.S. K	Test Rept L	Wiring Diagram M	Piping Diagram N
Section 02100 Site Clearing and Demolition														
Waste Handling Plan							X							
Traffic Control Plan							X							
Dust Control Plan							X				X			
Section 02200 Earthwork														
Fill Material						X	X				X	X		
Compaction Test						X	X					X		
Section 02667 Water Lines														
Pipe						X	X					X		
Fitting, Valves						X	X					X		
Section 02675 Disinfection of Water Distribution System														
Disinfection Report							X				X	X		
Bacteriological Report							X				X	X		

000016

PARSONS
ERA PROJECT

Attachment 1 to Section 01100 of Specifications
Submittal Listing
Division 2

Material/Equipment/Item/ Description	Shop Dwgs A	Cat/ Curves B	List Only C	Fin Smpl D	Phys Smpl E	Mat/Per Certif F	Tech Specs G	Eng'g Calcs H	Parts List I	IOM Mnls J	M.S. D.S. K	Test Rept L	Wiring Diagram M	Piping Diagram N
Section 02600 Storm Drainage														
Pipe						X	X							
Casting	X													
Manholes and Catch Basins	X					X	X							
Wet Well	X						X							
Non-Woven Geotechnical Fabric						X	X							
Matting						X	X							
Excelsior						X	X							
Section 02700 Sanitary														
Pipe						X	X							
Fittings, Valves						X	X							
Section 02770 Ponds - Storm Water Basin														
Pipe						X	X							
Fitting, End Sections						X	X							

PARSONS
ERA PROJECT

Attachment 1 to Section 01100 of Specifications
Submittal Listing
Division 2

Material/Equipment/Item/ Description	Shop Dwgs A	Cat/ Curves B	List Only C	Fin Smpl D	Phys Smpl E	Mat/Per Certif F	Tech Specs G	Eng'g Calcs H	Parts List I	IOM Mnls J	M.S. D.S. K	Test Rept L	Wiring Diagram M	Piping Diagram N
Section 02830 Chain Link Fences														
Fabric, Posts, Accessories Fittings, Barbed Wire	X					X	X							
Section 02900 Seeding														
Grass Seed						X	X							
Soil Nutrients							X							
Soil Conditioners							X							
Filter Fabric					X		X							
Mulch							X							
Section 02300 Boring and Jacking														
Shoring	X					X	X							
Pipe						X	X							

000047

PARSONS
ERA PROJECT

Attachment 1 to Section 01010 of Specifications
Submittal Listing
Division 16

Material/Equipment/Item/Description	Shop Dwgs AA	Cat/ Curves BB	List Only CC	Fin Smpl DD	Phys Smpl EE	Mat/Per Certif FF	Tech Specs GG	Eng'g Calcs HH	Parts List II	IOM Mnls JJ	M.S. D.S. KK	Test Rept LL	Wiring Diagram MM	Piping Diagram NN
Section 16050 - Basic Electrical Materials and Methods														
Section 16118 - Underground Ductbanks and Ducts														
Conduit and Fittings		X				X								
Section 16170 - Grounding and Bonding														
Grounding Electrodes		X				X					X	X		
Grounding Conductors		X				X					X	X		

000043

SECTION 01011
SCHEDULE OF DRAWINGS

1.1 DRAWINGS

A. The following drawings are hereby made a part of this contract:

Drawing Number	Drawing Title
94X-5900-X-00925	Project Title Sheet
94X-5900-X-00926	Drawing Index
94X-5900-X-00927	Legend and Symbols
94X-5900-G-00899	Civil - Site Plan - Plant Layout and Access
94X-5900-G-00898	Civil - Utility Plan - Layout of Utilities and Tie-Ins
94X-5900-G-00906	Civil - Grading and Drainage Plan
94X-5900-G-00908	Civil - Storm Drain Profiles
94X-5900-G-00900	Civil - Waterline Profiles
94X-5900-G-00910	Civil - Sanitary Sewer and Utility Profiles
94X-5900-G-00902	Civil - Details - Sheet 1 of 2
94X-5900-G-00909	Civil - Details - Sheet 2 of 2
94X-5900-G-00911	Civil - Sanitary Sewer Details
94X-5900-G-00913	Civil - Stormwater Management Details - Sheet 1 of 2
94X-5900-G-00912	Civil - Stormwater Management Details - Sheet 2 of 2
94X-5900-G-00924	Civil - Waterline Details
94X-5900-F-00919	Mechanical Process - Utility Flow Diagram - Underground Utilities
94X-5900-N-00921	Mechanical Process - Piping and Instrumentation Diagram - Symbols and Legend Sheet
94X-5900-N-00920	Mechanical Process - Piping and Instrumentation Diagram - Underground Utilities
94X-5900-E-00938	Electrical - Electrical Site Plan - Underground Ductbank Routing

END OF SECTION

SECTION 02100
SITE CLEARING AND DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Remove surface debris.

B. Remove paving.

C. Clear and grub site only where construction is affected.

D. Remove fencing as shown on the drawing.

E. Remove 30-inch RCP storm sewer as shown on the drawings.

F. Remove only underground and aboveground utilities as designated.

G. Topsoil excavation.

H. Dust control.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02200 - Earthwork.

C. Section 02600 - Storm Drainage.

D. Section 02830 - Fences.

E. Section 02900 - Seeding.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. Fernald Procedure EP-0003 Unexpected Discovery of Cultural Resources.

1.5 QUALITY ASSURANCE

A. Erosion and sedimentation control shall comply with requirements of Sections 02200 and 02900.

1.6 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Prior to the placement of debris into containers, the Subcontractor shall submit a detailed waste handling plan in accordance with the subcontract, Part 6, Scope of Work, for approval by FERMCO.

C. Submit traffic control plan and details on the type of barricade to be used.

D. Prior to initiating site clearing or earth-moving operations, the Subcontractor shall submit a dust control plan for approval by FERMCO. Along with the plan, the manufacturer's Material Safety Data Sheets' recommendations for material handling and usage for any proposed additives within the water sprays shall be submitted.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Chemical additives for the control of dust emissions shall be handled and stored according to the manufacturer's recommendations.

1.8 SEQUENCING AND SCHEDULING

A. Coordination:
   1. Coordinate clearing work with FERMCO.
   2. Sequence clearing work with erosion control measures stated in Sections 02600 and 02900.

PART 2 PRODUCTS

2.1 MATERIALS

A. Dust control materials shall be nonhazardous. Water shall be potable.

2.2 EQUIPMENT

A. Access control barricades are to be portable so they can be moved daily to allow through traffic during non-work periods. They should be marked with 4-inch to 8-inch-wide reflective orange and white diagonal stripes.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that existing utilities designated to remain are staked, flagged, and identified.

B. All work to follow Fernald Procedure EP-0003.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Clearing:
1. Clear only areas required for access to site and execution of work. Obtain written approval of clearing limits from FERMCO.
2. Remove trees and shrubs within marked areas indicated.
3. Clear undergrowth and deadwood without disturbing subsoil.
4. Provide dust control using clean potable water to the satisfaction of FERMCO.

B. Removal:
1. Remove debris, rock, and extracted plant life.
2. Remove existing fence as indicated on the drawings. Stockpile chain link in a tied roll and stack posts in a neat pile at a location on site determined by the FERMCO. Re-use existing fencing wire fabric.

3. Existing 30-inch RCP line to be removed after new 30-inch line is installed.

C. Topsoil Excavation:
1. Excavate topsoil from areas to be excavated or to receive fill.
2. Stockpile in area designated on site to a height not exceeding 8 feet. Protect from erosion. Remove excess topsoil not re-used from the stockpile to a site designated by FERMCO.

D. Excess Debris and Waste:
Excess debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

3.3 PROTECTION

A. Locate, identify, and protect from damage all utilities that remain.

B. Protect trees, plant growth, and features designated to remain as final landscaping.

C. Protect survey benchmarks, monitoring wells, and existing structures from damage or displacement.

D. Construct temporary roads and maintain existing roadways at the construction site, including dust control.

END OF SECTION

SECTION 02200
EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Site grading.

B. Excavating.

C. Backfilling and compacting.

D. Landscape grading.

E. Redistribution of topsoil.

F. Sampling and testing.

G. Trenching for utilities.

H. Soil and aggregate materials.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02100 - Site Clearing and Demolition.

C. Section 02300 - Boring and Jacking.

D. Section 02600 - Storm Drainage.

E. Section 02667 - Water Lines.

F. Section 02700 - Sanitary.

G. Section 02720 - Stormwater Management Basin.

H. Section 02830 - Chain Link Fences.

I. Section 16118 - Underground Duct Banks, Ducts, and Manholes.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1.	ASTM C136-92	Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
2.	ASTM D422-63	Standard Test Method for Particle-Size Analysis of Soils (reapproved 1990).
3.	ASTM D698-91	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).
4.	ASTM D1556-90	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
5.	ASTM D2487-92	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
6.	ASTM D2922-91	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
7.	ASTM D3017-88	Standard Test Methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

B. State of Ohio, Department of Transportation (ODOT), Construction and Materials Specifications, January 1, 1995.

1.	ODOT 200	Earthwork.
2.	ODOT 203	Roadway Excavation and Embankment.
3.	ODOT 207	Temporary Soil Erosion and Sediment Control.
4.	ODOT 304	Aggregate Base.

C. Fernald Environmental Restoration Management Corporation (FERMCO) Procedures:
1. EP-0003 Unexpected Discovery of Cultural Resources.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Materials Source: Submit name of imported materials suppliers. Change of source requires FERMCO's approval.

C. Material suppliers shall be required to certify that supplied materials meet specifications prior to use.

D. Accurately record actual locations of utilities (i.e., buried pipe, conduit, or cable) remaining, by horizontal dimensions, elevations or inverts, and slope gradients. Submit information on as-built drawings.

E. Submit name and address of soil testing laboratory for approval. Provide FERMCO with copies of all lab field soil tests performed by soil testing laboratory within 3 days from date of test.

1.6 QUALITY ASSURANCE

A. Unless noted otherwise, all work shall be done in accordance with ODOT Section 200.

B. All work shall be done in accordance with the requirements of FERMCO.

C. The Subcontractor shall arrange and pay for the services of a qualified, independent soil testing laboratory.

D. If tests indicate that the materials do not meet specified requirements, change the material and retest at no cost to FERMCO.

PART 2 PRODUCTS

2.1 MATERIALS

A. Every effort shall be made to re-use surplus materials generated by the project before importing material from off site.

B. Subsoil Type S1: Excavated and re-used material; graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris; conforming to ASTM D2487 Group Symbol CL, ML, CH.

C. Subsoil Type S2: Imported material; graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris; conforming to ASTM D2487 Group Symbol CL, ML, SC.

D. Topsoil Type S3: Excavated and re-used material; graded; free of roots, rocks larger than 1/2 inch, subsoil, debris, weeds, and foreign matter not suitable for subsequent seeding operations and maintenance; conforming to ASTM D2487 Group Symbol OH.

E. Coarse Aggregate Type A2: Conforming to ODOT Item 304 - Aggregate Base:

1. The aggregate shall be crushed carbonate, crushed gravel, crushed air-cooled slag, granulated slag, admixture of crushed and granulated slag, or other types of suitable materials meeting the requirements of this item. Crushed carbonate stone or mixtures of crushed and granulated slags shall meet the following gradation requirements:

Sieve Size	Percent Passing
2 inches	100
1 inch	70-100
3/4 inch	50-90
No. 4	30-60
No. 30	7-30
No. 200	0-13

F. Fine Aggregate Type A3: Sand - natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C136 and D2487; within the following limits:

Sieve Size	Percent Passing
No. 4	90-100
No. 50	7-40
No. 200	0-10

PART 3 EXECUTION

3.1 PREPARATION

A. The Subcontractor is responsible for all earthwork layout.
   1. FERMCO will provide horizontal and vertical control points, which shall be verified by the Subcontractor prior to starting work.
   2. The Subcontractor shall take necessary precautions to protect control points during the construction.

B. Verify that survey benchmark and intended elevations for the work are as indicated.

C. Identify and flag known utility locations which exist in the construction area.

D. Maintain and protect existing utilities and monitoring wells to remain.

E. The Subcontractor shall notify FERMCO when the actual conditions differ in any manner from that specified in the contract documents or when soft or spongy areas or other unusual soil conditions are encountered. Discontinue affected work until notified by FERMCO to resume work.

F. No backfill shall be placed around or upon any structure/foundation until it is shown that the concrete has attained satisfactory strength.

G. Install erosion and sediment control measures in accordance with Section 02600.

H. All work shall follow FERMCO Procedure EP-00003.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Excavation:

1. Excavate subsoil required to accommodate foundations, slabs on grade, site structures, and construction operations.
2. Slope banks to 2 horizontal to 1 vertical or flatter unless shored.
3. Correct unauthorized excavation at no extra cost to FERMCO.
4. Hand-trim excavation for structural slabs on grade. Remove loose material.
5. Do not interfere with 45-degree bearing splay of foundations.
6. Stockpile excess soil in the area designated on the contract drawings or as directed by FERMCO.
7. Perform grading and other operations to maintain site drainage. No water shall be permitted to accumulate in excavations under paving areas or equipment pads. Control water by means of ditches, dams, temporary pumps and piping, plastic coverings, tarps, or other methods acceptable to FERMCO. Construct stormwater basin first.

8. Areas that are disturbed or that lose firmness before concrete is poured shall be undercut, backfilled, and compacted as specified in Article 3.3, Paragraph F. At the Subcontractor's option, a lean concrete (2,500 psi at 28 days) may be installed.
9. If, during excavation, unknown debris, lumped subsoil, boulders, and rock up to 1/3 yd^3 is encountered, it shall be removed and placed as directed by FERMCO.

B. Topsoil Excavation:
1. Excavate topsoil and stockpile clean topsoil in the area designated on the contract drawings.

C. Trenching:
1. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
2. Hand-trim excavation and leave free of loose matter.
3. Support pipe during placement and compaction of bedding fill.
4. Backfill trenches to required contours and elevations.
5. Install trace wire as indicated in Section 02667.

D. Filling and Backfilling for all Excavations:
1. Prepare subgrade as follows:
   a. Compact exposed subgrade to density requirements for subsequent backfill materials.
   b. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Type A3 fill and compact to density equal to or greater than requirements for subsequent fill material.
2. Backfill areas to contours and elevations shown. Use unfrozen and unsaturated materials.
3. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
4. Unsatisfactory subgrade:
   a. Where unsatisfactory subsurface conditions in an area of backfill are observed, excavate

unsatisfactory material to satisfactory subgrade as approved by FERMCO.

b. Backfill with fill material required for specific area. Compact to density required for the area.

5. Place and compact fill materials in continuous layers not exceeding 8 inches loose depth.
6. Employ a placement method so as not to disturb or damage foundations or utilities in trenches.
7. Maintain moisture content within ±3 percent of optimum moisture as determined by ASTM D698.
8. Backfill against foundations and pads as specified in Article 3.3, Paragraph F.
9. Slope grade away from foundations and pads a minimum 1/4 inch per foot, unless noted otherwise.
10. Backfill simultaneously on each side of unsupported foundation walls.

E. Backfill Over Underground Utilities:

1. Initial backfill from top of bedding to 1 foot, minimum above pipe, Type A3 material compacted in 6-inch layers, minimum density 95 percent Standard Proctor (ASTM D698).
2. Final backfill Type S1 or S2, A2, or A3 from top of initial backfill to subgrade, compacted to 95 percent Standard Proctor (ASTM D698).

F. Placing Topsoil:

1. Clean up and restore areas disturbed by and during construction operations and/or occupied by the Contractor's temporary facilities. Place a minimum of 4 inches of compacted topsoil on all such areas prior to final acceptance of the project by FERMCO.
2. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slope into level areas.
3. Remove large stones, roots, grass, weeds, debris, and foreign material while spreading.
4. Roll placed topsoil.
5. Leave stockpile area and site clean, raked, and with positive drainage, ready to be seeded.

G. Material Stockpiles:
1. Stockpile materials on site at a location designated by FERMCO.
2. Separate differing materials with dividers, or stockpile apart to prevent mixing.
3. Direct surface water away from stockpile site to prevent erosion or deterioration of materials. Prevent silt migration at the stockpile perimeter.
4. Provide stormwater runoff controls at pile to prevent sediment from leaving stockpile area.

H. Dust Control: Provide dust control using potable water or other materials in accordance with Section 02100.

I. Dewatering:
1. Should dewatering be required, a written plan of drainage procedures shall be submitted to FERMCO for approval.
2. Dewatering shall be achieved by gravity or by pumps. All methods shall be of sufficient capacity to keep excavations/trenches sufficiently dewatered.

J. Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire work under this section shall be in compliance with the provisions of ODOT Items 203 and 207.

K. The Subcontractor may use lean concrete, minimum compressive strength of 2,500 psi, to correct over-excavation.

3.3 FIELD QUALITY ASSURANCE

A. Proof Rolling: The existing subgrade shall be proof rolled to identify soft areas. Proof rolling shall be by a pneumatic-tired vehicle with a minimum loaded weight of 20 tons.

B. Compaction testing will be performed in accordance with ASTM D698, ASTM D1556, ASTM D2922, and ASTM D3017.

C. Grain size analysis shall be performed in accordance with ASTM D422.

D. If compaction tests indicate that work does not meet specified requirements, remove work and replace at no additional charge to FERMCO.

E. Frequency of Tests:

1. Frequency of in-place density testing shall be whichever of the following requires the greatest number of tests:
   a. Once each day of work filling.
   b. Once every layer of fill.
   c. Once every 100 cubic yards of fill.
   d. Every 2,000 square feet under paving, slab on grade.
   e. Under each foundation at subgrade.

F. The Subcontractor shall notify FERMCO of activities that will require testing/inspection, at least 24 hours prior to the start of such activities.

G. Minimum Compaction Requirements:

Location	Required Compaction
Under Slabs and Buildings (Fill Type A3)	100 percent Standard Proctor (ASTM D698)
Trenches	95 percent Standard Proctor (ASTM D698)
All other fill (Fill Type S1 or S2)	95 percent Standard Proctor (ASTM D698)

3.4 ADJUSTING

A. Grading and Filling: Plus or minus 1 inch of indicated finish subgrade at structures. Other areas graded to drain at plus or minus 3 inches.

B. Top of Topsoil: Plus or minus 3 inches of required elevation or plane.

3.5 CLEANING

A. Remove soil stockpiles, leaving the area in a clean and neat condition. Grade and stabilize site surface to prevent freestanding surface water.

B. Excess debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

3.6 PROTECTION

A. Grade excavation top perimeter to prevent surface water runoff from entering into excavation or to adjacent properties.

B. Protect finished work and existing features, and landscaping which will remain.

C. Reshape and recompact fills subjected to vehicular traffic to final grade and to compaction requirements given in Article 3.3.

D. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

E. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

F. Provide erosion and sediment control in accordance with Section 02600.

END OF SECTION

SECTION 02300
BORING AND JACKING

PART 1 GENERAL

This section covers materials and installation of fire protection (FQ) line, potable water line (DW), process water (TW), and electrical ducts under the K-65 slurry trench.

1.1 SECTION INCLUDES

A. Excavation: The removal and disposal of the excavated material in conformity with the lines, grades, and dimensions shown on the drawings.

B. Unauthorized excavation: Excavation not required by the specifications or drawings or not authorized in writing by FERMCO.

C. Backfill: Backfill with Type S1 material as specified in Section 02200. Backfilling of pits shall be brought to the lines and grade existing before excavation.

D. Shoring: Sheet piling or timber shoring system, which supports the sides of the excavation.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02100 - Site Clearing and Demolition.

C. Section 02200 - Earthwork.

D. Section 02600 - Storm Drainage.

E. Section 02667 - Water Lines.

F. Section 02900 - Seeding.

G. Section 16118 - Underground Duct Banks.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM), Annual Book of Standards:
   1. ASTM A139-90 Standard Specifications for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over).

B. American Water Works Association (AWWA), AWWA Standards:
   1. ANSI/AWWA C203-91 AWWA Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied.

C. Occupational Health and Safety Administration (OSHA), Code of Federal Regulations 29 CFR 1926, Subpart P - Excavations, 1989.

1.5 SYSTEM DESCRIPTION

A. This section involves work which requires earthwork, excavation, stockpiling, backfilling, and compaction relating to the boring and jacking for fire protection line, potable water line, process water line, and electrical ducts.

B. Definitions:
   1. Utility: Any buried pipe or conduit.

1.6 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Submit written notice of intent to begin boring and jacking operations to FERMCO a minimum of 7 days before beginning work.

1.7 PROJECT/SITE CONDITIONS

A. Location of underground utilities based on information provided by FERMCO. Contractor shall be aware that utilities may exist which are not shown on the construction drawings. Contractor shall verify location of all utilities before construction.

1.8 SEQUENCING/SCHEDULING

A. Coordination:
   1. Coordinate boring and jacking work with FERMCO.
   2. Coordinate with contractors for installation of fire protection line, potable water line, process water line, and electrical ducts.

PART 2 PRODUCTS

2.1 MATERIALS

A. Boring and Jacking:
   1. Steel casing pipe shall have diameter sufficient to accommodate pipes as specified on the construction drawings. Steel casing pipe shall be spiral or straight seam welded steel pipe conforming to ASTM A139, Grade B, with a minimum wall thickness of 0.312 inches.
   2. Steel casing shall be coated on the outside with Type II, coal-tar enamel in accordance with AWWA C203.

PART 3 EXECUTION

3.1 INSTALLATION/APPLICATION/ERECTION

A. Before excavation begins, provide erosion and sediment control to minimize erosion and the transport of sediment beyond the limits of the Contractor's work area. Methods of control shall conform to Sections 02600 and 02900.

B. Excavate boring and receiving pits to the width, length, and depth necessary for boring and jacking operations.

C. Pits shall be located a minimum of 2 feet beyond toe-of-slopes, and a minimum of 3 feet beyond far bank of ditches or swales.

D. Excavated materials shall be stockpiled in areas designated by FERMCO, and in accordance with OSHA 29 CFR 1926, Subpart P - Excavations. Excavated materials or equipment shall not be placed on pavement or shoulders of roadway.

E. Boring and jacking operations shall begin immediately after excavation of the pits has been completed.

F. Bored installations shall be a bored-hole diameter essentially the same as the outside diameter of the casing pipe to be installed.

G. Casing pipe shall be jacked into boring as soon as possible after boring is made. Lengths of casing pipe as long as practical shall be used. Joints between sections of casing pipe shall be welded as recommended for joining the particular type of pipe.

H. Care shall be taken to ensure that casing pipe installed by boring and jacking is at the proper alignment and grade.

I. Boring, jacking, or driving casing pipe under K-65 slurry trench shall be accomplished without jetting, sluicing, or wetboring.

J. After casing pipe is installed, the carrier pipes shall be installed in such a manner as to protect coating, lining, and joint integrity. Each carrier pipe shall be placed in proper horizontal and vertical alignment using wooden blocking/wedges or prefabricated pipe collars spaced radially around pipe and secured firmly in place. Blocking or collars shall be installed around the pipes such that joints do not touch. Spacing of blocking or collars shall be no greater than 10 feet on center longitudinally in casing pipe.

K. Close ends of casing pipe with concrete brick and mortar.

L. Promptly backfill excavated pits as directed by FERMCO. Backfill materials shall be placed in 6-inch layers and tamped. Backfilling of pits shall be brought to the lines and grade existing before excavation in accordance with Section 02200. Prior to backfilling, materials shall be surveyed by FERMCO and approved for use.

M. Excavated material not used as backfill for pits shall be disposed of in areas designated by FERMCO.

3.2 PROTECTION

A. Protect excavation by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in of loose soil into excavation. Protection shall be in accordance with OSHA 29 CFR 1926, Subpart P - Excavations.

B. Excavations 5 feet or more in height shall be shored, laid back to a stable slope, or provided with some other equivalent means of protection.

C. Refer to OSHA 29 CFR 1926, Subpart P - Excavations, as a guide to minimum requirements for slopes that are laid back.

D. Refer to OSHA 29 CFR 1926, Subpart P - Excavations, as a guide to minimum requirements for shoring or bracing.

E. Excavations less than 5 feet in depth shall also be effectively protected when examination of the ground indicates that hazardous ground movement may be expected.

F. Employees required to be in excavations 4 feet deep or more shall have an adequate means of exit, so as to require no more than 25 feet of lateral travel.

3.3 CLEANING

A. Leave the site in a condition suitable for final grading, surfacing, or stabilization.

END OF SECTION

SECTION 02600
STORM DRAINAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. High-density polyethylene (HDPE) pipe.

B. Concrete manholes, and cover.

C. Concrete Wet Well.

D. Concrete catch basins, frames, and covers.

E. Corrugated steel pipe and fittings.

F. Riprap ditch and channel protection.

G. Maintenance of erosion control measures within the Subcontractor's work area.

H. Soil erosion and sedimentation control for areas of the Subcontractor's work area which are graded or disturbed as a part of the contract work.

I. Maintenance and removal of temporary erosion control facilities.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02100 - Site Clearing and Demolition.

C. Section 02200 - Earthwork.

D. Section 02667 - Water Lines.

E. Section 02900 - Seeding.

F. Section 02700 - Sanitary.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1.	ASTM C478-93	Standard Specification for Precast Reinforced Concrete Manhole Sections.
2.	ASTM D698-91	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).
3.	ASTM D977-91	Standard Specification for Emulsified Asphalt.
4.	ASTM D1777-64	Standard Test Method for Measuring Thickness of Textile Materials (R 1975).
5.	ASTM D3035-93	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
6.	ASTM D3776-85	Standard Test Method for Mass per Unit Area (Weight) of Woven Fabric (R 1990).
7.	ASTM D3786-87	Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Test Method.
8.	ASTM D4491-92	Standard Test Method for Water Permeability of Geotextiles by Permittivity.
9.	ASTM D4533-91	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
10.	ASTM D4632-91	Standard Test Method for Grab Breaking Load and Elongation of Textiles.
11.	ASTM D4751-93	Standard Test Method for Determining Apparent Opening Size of a Geotextile.
12.	ASTM D4833-88	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

B. American Water Works Association (AWWA):

1.	AWWA C906-90	Polyethylene (PE) Pressure Pipe and Fittings, 4-Inch through 63-Inch, for Water Distribution.

C. State of Ohio, Department of Transportation, Construction and Material Specification, January 1, 1995 (ODOT):

1.	ODOT 604	Manholes, Catch Basins, Inlets, Inspection Wells, Junction Chamber, or Monuments.
2.	ODOT 659.06	Mulching Material.
3.	ODOT 667	Seeding and Jute Matting.
4.	ODOT 668	Seeding and Excelsior Matting.
5.	ODOT 706	Concrete and Clay Pipe.
6.	ODOT 706.13	Precast Reinforced Concrete Manhole Riser Sections, Catch Basin, and Inlet Tops and Temporary Barrier.
7.	ODOT 707.01	Metallic Coated Corrugated Steel Conduit.
8.	ODOT 707.02	Metallic Coated Corrugated Steel Conduits.
9.	ODOT 707.05	Bituminous Coated Corrugated Steel Pipe and Pipe Arches with Paved Invert.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Product Data: Provide data on all pipe materials, pipe fittings, accessories, manholes, catch basins, and the methods for installation.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents:

1. Accurately record actual locations by NAD83 coordinates of all underground culverts and headwalls; invert elevations, size, and type; and show on as-built drawings.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

E. As-built drawings, signed and sealed by a professional surveyor registered in the State of Ohio.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to construction site.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe:
   1. HDPE Pipe: AWWA C906 (PE 3408), ASTM D3035, SDR 32.5:
      a. Fitting: AWWA C906, molded, butt fusion weld to pipe.
      b. Joints: Butt fusion.
   2. Culvert Pipe and Fittings:
      a. The pipe and fittings shall be bituminous coated corrugated steel pipe and pipe arches with paved invert conforming to ODOT Items 7070.01, 707.02 and 707.05, with a wall thickness of 0.064 inches.
      b. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.
      c. End sections shall have sides tapered to blend with the contour of the slope.

B. Bedding Materials:
   1. Bedding: Fill Type A3 as specified in Section 02200.

C. Manholes and Catch Basins:
   1. The manholes and catch basins shall conform to precast reinforced concrete manhole riser sections and catch basins in ODOT Section 706 and ASTM C478.

D. Lift Station Wet Well:
   1. The wet well shall conform to precast reinforced concrete manhole riser sections per ODOT Item 706.13 and ASTM C478.

E. Manhole and catch basin frames and lids shall be heavy-duty cast iron as noted on the drawings.

2.2 ACCESSORIES

A. Concrete:
1. 3000 psi (minimum) poured against undisturbed soil or compacted fill.

B. Mulch:
1. Mulch shall meet requirements of ODOT Item 659.06.
2. Materials used for mulching shall be straw or hay. They shall be reasonably free of weed seed and such foreign materials as may detract from their effectiveness as a mulch or injure desired plant growth.

C. Matting:
1. Matting shall meet the requirements of ODOT Items 667 or 668.
2. Matting shall be of a uniform open plain weave of undyed and unbleached single jute yarn or excelsior. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than half its normal diameter. Matting shall be furnished in rolled strips as follows:
   a. Length: Minimum 50 yards.
   b. Width: 48 inches plus or minus 1 inch.
   c. Warp Ends Width: 81 plus or minus 3.
   d. Weft Ends per Yard: 41 plus or minus 3.
   e. Average Weight: 1.22 pounds per linear yard plus or minus 10 percent.

   Staples used to fasten the matting shall be made from 12-inch lengths of No. 11 gage steel wire bent into narrow "U" shape with the ends of the staple approximately 1 inch apart. For clay, shale, and other heavy soils, a 3-inch steel staple, at least 9 gage with points approximately 1 inch apart will be used.
3. Excelsior matting shall consist of a machine-produced mat of wood excelsior, 80 percent of which is at least 8 inches in length. The wood from which the excelsior is cut shall be properly cured to achieve adequately curled and barbed fibers.

The matting shall be of consistent thickness, with the fiber evenly distributed over the entire area of the mat. The matting shall be covered on the top side with netting having a maximum 3-inch by 1-inch weave, twisted kraft paper yarn having a high wet strength, or biodegradable plastic, and entwined with the excelsior for maximum strength and ease of handling.
The matting may be 24, 36, or 48 inches in width, plus or minus 1 inch, and in rolls of more than 100 feet in length. The weight of the material shall be not less than 0.72 pound per square yard, constant weight, air dry.

D. Bales: Hay or straw bales shall be reasonably free of weed seed and such foreign materials as may detract from their effectiveness or be injurious to desired plant growth.

E. Emulsified Asphalt: Conforming to requirements of ASTM D977 for slow-setting type SS-1.

F. String: Jute twine.

G. Stakes: Stakes shall be wooden (2 inches by 2 inches), reinforcing bars, or fence posts.

H. Water: Clean, fresh (not salt water), and free of substances or matter which could inhibit vigorous growth of grass.

I. Non-woven geotechnical fabric per the following table and similar to Trevira No. 011/250 as manufactured by Hoechst Celanese Corp.:

Minimum Physical Properties (Minimum Average Roll Values)			
Property	**Test Method**	**Units**	**Material**
Unit weight	ASTM D-3776	oz/yd^2	7.1
Grab tensile	ASTM D-4632	lbs	210
Grab elongation	ASTM D-4632	percent	60
Mullen burst	ASTM D-3786	psi	360
Puncture	ASTM D-4833	lbs	95
Trapezoid tear	ASTM D-4533	lbs	75
Apparent opening size	ASTM D-4751	US sieve number	70
Permittivity Water Flow Rate	ASTM D-4491 ASTM D-4491	sec^{-1} $gal/min/ft^2/$	110 1.47
Permeability	ASTM D-4491	cm/sec	.35
Thickness	ASTM D-1777	mils	95

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are ready to receive work.

B. Construct protective devices as specified herein and as required on the construction drawings.

3.2 PREPARATION

A. Hand trim excavations. Correct over-excavation according to the requirements of Section 02200 of this specification package.

B. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.

C. Remove debris, weeds, and undesirable plants and their roots. Remove contaminated subsoil.

D. Scarify subsoil to a depth of 3 inches where topsoil is to be placed.

E. Repeat cultivation in areas where equipment used for hauling and spreading of topsoil has compacted subsoil.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Installation:
1. Excavate soil to a depth and width as shown on drawings.
2. Place corrugated steel pipe in properly excavated trench with bedding in place, as shown on the drawings, and properly compact backfill around pipe.

B. Bedding:
1. Place pipe on sand bedding material, Type A3 (per Section 02200), as indicated on drawings.
2. Backfill shall be placed in 6-inch layers and compacted to 95 percent Standard Proctor per ASTM D698. Puddling of backfill will not be allowed.
3. Maintain moisture content at optimum (±3 percent).

C. Backfill:
1. See Section 02667 for installation of backfill materials.

D. Placing Topsoil:
1. Spread topsoil to a depth of 4 inches (±1 inch) over areas to be seeded. Rake until smooth.
2. Place topsoil on unsaturated, unfrozen subgrade.
3. Remove vegetative matter and foreign non-organic material from topsoil while spreading.
4. Grade topsoil to eliminate rough, low, or soft areas and to ensure positive drainage.

E. Straw Bales: Install straw bales in accordance with drawings.

F. Protection:
1. Berms and Diversion Ditches: Miscellaneous berms and diversion ditches shall be provided to protect sloping area from erosion.

a. Locate to direct runoff as required. Size to prevent overflowing.
b. Use hay bale check dams to filter out the suspended matter, as required.
c. Filter fabric shall be placed under all riprap.

2. Protect pipe from damage or displacement until backfilling operation is complete.
3. Excavation shall proceed in a manner to locate and protect existing underground utilities in the vicinity of construction.
4. Protect storm drains and ditches from siltation during construction as specified. Storm drains and ditches shall be free of sediment and erosion problems at project completion.

G. Excess Debris and Waste:
1. Excess debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

H. Manholes, Catch Basins, and Inlets:
1. Install in accordance with ODOT Item 604.

END OF SECTION

SECTION 02667
WATER LINES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings for underground:
   1. Fire water lines (FQ).
   2. Potable water lines (DW).
   3. Process water lines (TW).
   4. Thrust blocks.

B. Valves, fire hydrants, and tap connections

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02200 - Earthwork.

C. Section 02300 - Boring and Jacking.

D. Section 02675 - Disinfection of Water Distribution Systems.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM D698-91 — Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft^3) (600 kN-m/m^3).
   2. ASTM D2922-91 — Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

3.	ASTM D3017-88	Standard Test Methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
4.	ASTM D3035-93	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
5.	ASTM D2321-89	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

B. American Water Works Association (AWWA):

1.	AWWA C105-88	Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.
2.	AWWA C110/ A21.10-93	Ductile-Iron and Gray-Iron Fittings, 3-Inch through 48-Inch, for Water and Other Liquids.
3.	AWWA C111/ A21.11-90	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4.	AWWA C151/ A21.51-91	Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
5.	AWWA C500-93	Metal-Seated Gate Valves for Water Supply Service.
6.	AWWA C502-85	Dry Barrel Fire Hydrant.
7.	AWWA C600-93	Installation of Ductile-Iron Water Mains and Their Appurtenances.
8.	AWWA C906-90	Polyethylene (PE) Pressure Pipe and Fittings, 3-inch through 63-Inch, for Water Distribution.

C. Underwriters Laboratories, Inc. (UL):

1.	UL 246	UL Standard for Safety Hydrants for Fire Protection Service, Seventh Edition.

D. National Fire Protection Association (NFPA):
1. NFPA 24-92 Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Product Data: Provide data on all pipe materials, pipe fittings, valves, accessories, and the methods and equipment for High-Density Polyethylene (HDPE) fusion welding.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents:
1. Accurately record actual locations by NAD83 coordinates of all underground utilities, piping mains, valves, connections, and invest elevations, and show on as-built drawings.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

E. As-built drawings, signed and sealed by a professional surveyor registered in the State of Ohio.

1.6 QUALITY ASSURANCE

A. Piping and Valves: Manufacturer's name and pressure rating marked on valve body.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to construction site.

B. Deliver and store valves and fire hydrants in shipping containers or pallets with labeling in place.

1.8 PROJECT PREPARATION

A. Drain lines into tanks or to trench.

B. Isolate lines prior to disconnect.

C. Coordinate shutdown of active lines with Pilot Vitrification Plant and Waste Pit Activities.

D. Schedule work to minimize length of time needed for shutdown. Tap in will probably occur over a weekend.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe:

1. Ductile-Iron Pipe: AWWA C151, Class 55:
   a. Fittings: AWWA C110, ductile-iron, cement-lined, standard thickness. All fittings and pipe at valves shall be flanged.
   b. Joints: AWWA C111, push-on, rubber gasket.
   c. Jackets: AWWA C105, PE encasement.
2. HDPE Pipe: AWWA C906 (PE 3408), ASTM D3035, SDR 11 for 160 psi pressure rating.
   a. Fittings: AWWA C906, molded, butt fusion weld to pipe.
   b. Joints: Butt fusion, flanged gasket joints, and molded adapter pipe at interface connections with ductile-iron pipe and valves.
   c. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "water service" in large letters.

B. Gate Valves:

1. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, Class 125 flanged ends, control rod, post indicator or extension box, and valve key.

C. Hydrant:

1. Hydrant: AWWA C502, UL 246, dry barrel type, inside dimension of 7 inches minimum, with minimum 5-1/4-inch diameter valve seat opening; 6-inch flanged joint inlet connection with accessories, gland bolts, and gaskets to match pipe.
2. Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.
3. Hose and Streamer Connection: Match sizes with FERMCO standard, two hose nozzles, one pumper nozzle.
4. Finish: Primer and two coats of enamel. Color to be orange body with green cap and top.

D. Bedding Materials:

1. Bedding: Fill Type A3 as specified in Section 02200.

2.2 ACCESSORIES

A. Concrete for Thrust Blocks: 3,000 psi (minimum). Poured against undisturbed soil or compacted fill.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions. Bring any discrepancies to FERMCO for resolution prior to start of work. Any discrepancies should be brought to FERMCO's attention in a written statement immediately upon discovery.

B. Verify that building service connection and site utility water main size, location, and invert are as indicated.

3.2 PREPARATION

A. Ream pipe and tube ends and remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment by using flanges or unions.

D. Excavate pipe trench in accordance with Section 02200 of this specification package for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated. Locate all existing utilities in the area and determine if they will interfere with the proposed utility. Notify FERMCO if there is an interference.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Installation - Pipe: Ductile-Iron Pipe

1. Maintain separation of water main from sewer piping (10-foot horizontal minimum, 18-inch vertical minimum), or sewer encased in concrete.
2. Install pipe to indicated elevation to within tolerance of ±1 inch at structures.
3. Install ductile-iron piping and fittings to AWWA C600.
4. Route pipe in straight line except as shown on drawing.
5. Install pipe to allow for expansion and contraction without stressing pipe or joints as per manufacturer's recommendations.
6. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main.
7. Establish elevations of buried piping to ensure cover of not less than 3 feet for process water, 3.5 feet for potable water, and 4 feet for fire protection piping.
8. Pipe bedding and backfill trench in accordance with Section 02200 of this specification package.

B. Installation - Pipe: HDPE

1. Maintain separation of water main from sewer piping (10-foot horizontal minimum, 18-inch vertical minimum).
2. Install pipe to indicated elevation to within tolerance of ±1 inch at structures.
3. Install HDPE piping and fittings to AWWA C906 (by butt weld fusion method).

4. Route pipe in line as shown on drawing.
5. Install pipe to allow for expansion and contraction without stressing pipe or joints as per manufacturer's recommendation.
6. Install access fittings to permit cleanout.
7. Form and place concrete for thrust blocks at each elbow, tee, or wye.
8. Establish elevations of buried piping to ensure not less than 3 feet for process water, 3.5 feet for potable water, and 4 feet for fire protection piping.
9. Install trace wire continuous over top of pipe, buried 6 inches below finish grade, above pipe line; coordinate with Section 02200 of this specification package.

C. Bedding:

1. Trench bedding shall be in conformance with ASTM D2321. Sand bedding material shall be Type A3, as indicated on drawings.
2. Place bedding material (Type A3) in maximum 6-inch lifts. Thoroughly tamp bedding using vibrating equipment or hand tamping.

D. Backfill:

1. Common trench:
   a. Place initial backfill (Type A3) in 6-inch layers to 1 foot above pipe and compact to 95 percent Standard Proctor per ASTM D698.
   b. Backfill Type S1 or S2 to top of trench and compact to 95 percent Standard Proctor per ASTM D698.
   c. Maintain optimum moisture content of initial backfill material to ±3 percent.
   d. Trench initial backfilling shall be in conformance with ASTM D2321.
2. Trench under pavement:
   a. Place backfill (Type A2) coarse aggregate in 6-inch layers and compact to 95 percent Standard Proctor per ASTM D698.
   b. Backfill (Type S1 or S2) fill material in 6-inch layers to subgrade and compact to 95 percent Standard Proctor per ASTM D698.

c. Maintain moisture content of initial backfill material to optimum ±3 percent.
d. Trench initial backfilling shall be in conformance with ASTM D2321.

E. Installation - Valves, Hydrants, and Post Indicator Valves:
1. Set valves, including post indicator valves, on solid bearing of concrete.
2. Center and plumb valve box over valve. Set box cover flush with finished grade with a tolerance of +2 inches to -1 inch.
3. Center and plumb indicator post over valve. Indicator post to extend above grade as shown on the drawings to plate window reading open and shut position.
4. Set hydrants plumb and locate pumper nozzle perpendicular to roadway.
5. Set hydrants to grade, with nozzles at least 18 inches aboveground.
6. Locate control valve 12 inches away from hydrant.

F. Disinfection of Potable Water Piping System:
1. Flush and disinfect system in accordance with Section 02675.

G. Excess Debris and Waste:
1. Excess debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

3.4 FIELD QUALITY ASSURANCE

A. Compaction testing shall be performed in accordance with ASTM D698, ASTM D2922, and ASTM D3017.

B. If tests indicate work does not meet specified requirements, remove and replace at no cost to owner.

C. Perform hydrostatic tests on all water piping. Notify FERMCO at least 24 hours in advance of planned testing.

Submit report to FERMCO within 3 days after completion of test.

D. Testing shall be in accordance with NFPA 24 except that test pressures shall be 160 psi for potable water and process water and 200 psi for fire water.

END OF SECTION

SECTION 02675
DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Disinfection of potable water lines.

B. Testing and reporting results.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02667 - Water Lines.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Water Works Association (AWWA):

1.	AWWA B300-92	Standard for Hypochlorites.
2.	AWWA B301-92	Standard for Liquid Chlorine.
3.	AWWA B302-90	Standard for Ammonium Sulfate.
4.	AWWA B303-88	Standard for Sodium Chlorite.
5.	AWWA C651-92	Standards for Disinfecting Water Mains.
6.	AWWA M12-75	Simplified Procedure for Water Examination.

B. Ohio Revised Code (ORC):

1.	ORC 3745-83	Operational Requirements.

1.5 SYSTEM DESCRIPTION

A. Qualifications:

1. Water Treatment Firm: Company specializing in disinfecting domestic water systems specified in

this section, with minimum 3 years documented experience.

2. Testing Firm: Company specializing in testing and examining domestic water systems, certified by the State of Ohio.

B. Regulatory Requirements:

1. Conform to applicable code or regulation for performing the work of this section, to include US Public Health Service Drinking Water Standards identified in AWWA M12 as well as ORC 3745-83.
2. Provide certificate of compliance from authority having jurisdiction, indicating approval of water system.

1.6 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Test Reports: Indicate results comparative to specified requirements.

C. Certificate: Certify that cleanliness of water lines meets or exceeds specified requirements.

D. Project Record Documents:

1. Disinfection report; record:
   a. Type and form of disinfectant used.
   b. Date and time of disinfectant injection start and time of completion.
   c. Test locations.
   d. Initial and 24-hour disinfectant residuals (quantity in treated water), in ppm, for each outlet sampled.
   e. Date and time of flushing start and completion.
   f. Disinfectant residual after flushing, in ppm, for each outlet sampled.
2. Bacteriological report; record:
   a. Date issued, project name, and testing laboratory name, address, and telephone number.
   b. Time and date of water sample collection.

c. Name of person collecting samples.
d. Test locations.
e. Initial and 24-hour disinfectant residuals, in ppm, for each outlet sampled.
f. Coliform bacteria test results for each outlet sampled.
g. Certification that water conforms, or fails to conform, to bacterial standards.
h. Bacteriologist's signature and authority.

1.7 QUALITY ASSURANCE

A. Perform work in accordance with AWWA C651.

PART 2 PRODUCTS

2.1 MATERIALS

A. Disinfection Chemicals:
1. Chemicals: AWWA B300, Hypochlorite; AWWA B301, Liquid Chlorine; AWWA B302, Ammonium Sulfate; and AWWA B303, Sodium Chlorite.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested prior to starting disinfection of the system.

B. Schedule and perform disinfection activity. Coordinate with start-up, testing, adjusting, balancing, and demonstration procedures.

C. Notify FERMCO at least 24 hours in advance of planned tests.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Provide and attach required equipment to perform the work of this section.

B. Introduce treatment into piping system.

C. Maintain disinfectant in system for 24 hours.

D. Flush, circulate, and clean until required cleanliness is achieved; use potable water.

E. Replace permanent system devices removed for disinfection.

F. Seal the piping system immediately after disinfection to ensure that contaminants do not enter the system.

3.3 FIELD QUALITY ASSURANCE

A. Provide analysis and testing of treated water.

B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 02700
SANITARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings for gravity sanitary sewer.

B. Pipe and fitting for sanitary force main.

C. Connection to existing 4-inch (SN) force main.

D. Lift station wet well.

E. Connections to wet well.

F. Thrust blocks.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02200 - Earthwork.

C. Section 02600 - Storm Drainage.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A126-93 Standard Specification for Gray Iron Casings for Valves, Flanges, and Pipe Fittings.
2. ASTM D698-91 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

3.	ASTM D2922-91	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4.	ASTM D3017-88	Standard Test Methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
5.	ASTM D3035-93	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

B. American Water Works Association (AWWA):

1.	AWWA C105-88	Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.
2.	AWWA C110/ A21.10-93	Ductile-Iron and Gray-Iron Fittings, 3-Inch through 48-Inch, for Water and Other Liquids.
3.	AWWA C111/ A21.11-90	Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
4.	AWWA C151/ A21.51-91	Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
5.	AWWA C600-93	Installation of Ductile-Iron Water Mains and Their Appurtenances.
6.	AWWA C606-87	Grooved and Shouldered Joints.
7.	AWWA C906-90	Polyethylene (PE) Pressure Pipe and Fittings, 4-Inch through 63-Inch, for Water Distribution.

C. National Fire Protection Agency (NFPA):

1.	NFPA 24-92	Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.4 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Product Data: Provide data on all pipe materials, pipe fittings, valves, accessories, and the methods and equipment for High-Density Polyethylene (HDPE) fusion welding.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents:
1. Accurately record actual locations by NAD83 coordinates of all underground utilities, piping mains, valves, connections, and invert elevations, and show on as-built drawings.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

E. As-built drawings, signed and sealed by a professional surveyor registered in the State of Ohio.

1.5 QUALITY ASSURANCE

A. Piping and Valves: Manufacturer's name and pressure rating marked on valve body.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to construction site.

B. Deliver and store valves in shipping containers or pallets with labeling in place.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe:

1. HDPE Pipe: AWWA C906 (PE 3408), ASTM D3035, SDR 17 for 100 psi pressure rating.
   a. Fitting: AWWA C906, molded, butt fusion weld to pipe.
   b. Joints: Butt fusion, flanged gasket joints, and molded adapter pipe at interface connections with ductile iron pipe and valves.
   c. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "sanitary sewer" in large letters.
2. Ductile Iron Pipe: AWWA C151, Class 55:
   a. Fittings: AWWA C110, ductile iron cement lined, standard thickness. All fittings and pipe at valves shall be flanged.
   b. Joints: AWWA C111, push-on, rubber gasket.
   c. Jackets: AWWA C105, PE encasement.

B. Plug Valves:

1. Valves shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the plans. Mechanical joint ends shall conform to AWWA C111, grooved ends per AWWA C606.
2. Valve bodies shall be of ASTM A126, Class B cast iron. Bodies in 4-inch and larger valves shall be furnished with a 1/8-inch welded overlay seat of not less than 90 percent pure nickel. Seat area shall be raised, with raised surface completely covered with weld to ensure that the plug face contacts only nickel. Screwed-in seats shall not be acceptable.
3. Plugs shall be of ASTM A126, Class B cast iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft. The interface between the plug face and body seat, with the plug in the closed position,

shall be externally adjustable in the field with the valve in the line under pressure. The plug shall be resilient faced with neoprene or hycar, suitable for use with sewage.

4. Valves shall have sleeve type metal bearings and shall be of sintered, oil impregnated, permanently lubricated.
5. Valve shaft seals shall be of the multiple V-ring type and shall be externally adjustable and replaceable without removing the bonnet or actuator from the valve under pressure. Valves utilizing O-ring seals or non-adjustable packing shall not be acceptable.
6. Valve pressure ratings shall be 175 psi. Each valve shall be given a hydrostatic and seat test with test results being certified when required by the specifications.
7. Manual valves shall have gear actuators and tee wrenches, extension stems, extension box, etc., as indicated on the plans. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque and to provide seat adjustment to compensate for change in pressure differential or flow direction change.
8. Valves and gear actuators for buried service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed nuts, bolts, springs, and washers shall be stainless steel. Actuators shall be equipped with an operating nut, control rod, extension box, and valve key.
9. Valves and actuators shall be as manufactured by Dezurik or approved equal.

C. Bedding Materials:
   1. Bedding and Initial Backfill: Fill Type A3 as specified in Section 02200.

D. Lift Station Wet Well:
   1. Precast concrete specified in Section 02600.
   2. Temporary roof cover shall be plywood, grade CDX.

2.2 ACCESSORIES

A. Concrete: 3,000 psi (minimum), poured against undisturbed soil or compacted fill.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions. Bring any discrepancies to FERMCO for resolution prior to start of work. Any discrepancies should be brought to FERMCO's attention in a written statement immediately upon discovery.

B. Verify that building service line and force main size, location, and invert are as indicated.

3.2 PREPARATION

A. Ream pipe and tube ends and remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Excavate pipe trench in accordance with Section 02200 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated. Locate all existing utilities in the area and determine if they will interfere with the proposed utility. Notify FERMCO if there is an interference.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Installation - Pipe: Ductile Iron Pipe

1. Maintain separation of water main from sewer piping (10-foot horizontal minimum, 18-inch vertical minimum), or sewer encased in concrete.
2. Install pipe to indicated elevation to within tolerance of 5/8 inches.
3. Install ductile iron piping and fittings to AWWA C600.
4. Route pipe in straight line except as shown on drawing.
5. Install pipe to allow for expansion and contraction without stressing pipe or joints as per manufacturer's recommendations.
6. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main.
7. Establish elevations of buried piping to ensure not less than 3.5 feet of cover.
8. Backfill trench in accordance with Section 02200.

B. Installation - Pipe: HDPE

1. Maintain separation of water main from sewer piping (10-foot horizontal minimum, 18-inch vertical minimum).
2. Install pipe to indicated elevation to within tolerance of 5/8 inches at structures.
3. Install HDPE piping and fittings to AWWA C906 (by butt weld fusion method).
4. Route pipe in line as shown on drawing.
5. Install pipe to allow for expansion and contraction without stressing pipe or joints as per manufacturer's recommendation.
6. Install access fittings to permit cleanout.
7. Form and place concrete for thrust blocks at each elbow, wye, or tee on the force main.
8. Establish elevations of buried force main piping to ensure not less than 3.0 feet of cover.
9. Install trace wire continuously over top of pipe, buried 6 inches below finish grade, above pipe line; coordinate with Section 02200.
10. Backfill trench in accordance with Section 02200.

C. Bedding:
1. See Section 02667 for bedding installation.

D. Backfill:
1. See Section 02667 for installation of backfill materials.

E. Installation - Valves:
1. Set valves on solid bearing of concrete.
2. Center and plumb valve box over valve. Set box cover flush with finished grade.

3.4 FIELD QUALITY ASSURANCE

A. Compaction testing will be performed in accordance with ASTM D698, ASTM D2922, and ASTM D3017.

B. If tests indicate work does not meet specified requirements, remove and replace at no cost to FERMCO.

C. Perform hydrostatic tests on sanitary force main in accordance with NFPA 24. Notify FERMCO at least 24 hours in advance of planned testing. Submit report to FERMCO within 3 days after completion of test. Test pressure shall be 100 psi.

D. Hydrostatic tests are not required for gravity sanitary sewer.

E. Debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

END OF SECTION

SECTION 02770
STORMWATER MANAGEMENT (SWM) BASIN

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet standpipe structure and accessories.

B. Concrete base.

C. Excavation.

D. Backfilling and compacting.

E. Soil and aggregate.

F. Riprap ends of culverts.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02200 - Earthwork.

C. Section 02600 - Storm Drainage.

D. Section 02830 - Chain Link Fences.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A36-94 Standard Specification for Carbon Structural Steel.
2. ASTM D698-91 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft/[600 kN-m/m^3).

B. State of Ohio, Department of Transportation, Construction and Material Specification, January 1, 1995 (ODOT):

1.	ODOT 703.01	Aggregate - General.
2.	ODOT 707.02	Metallic-Coated Steel Conduits.
3.	ODOT 707.05	Bituminous Coated Corrugated Steel Pipe and Pipe Arches with Paved Invert.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Product Data: Provide data on all pipe materials, pipe fittings, accessories, and the methods for installation.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents:
1. Accurately record actual locations by NAD83 coordinates of all underground culverts and headwalls; invert elevations, size, and type; and show on as-built drawings.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

E. As-built drawings, signed and sealed by a professional surveyor registered in the State of Ohio.

PART 2 PRODUCTS

2.1 FABRICATION

A. Pipe and Fittings:
1. The pipe and fittings shall conform to ODOT 707.02.
2. The pipe and fittings shall conform to ODOT 707.05.

3. End sections shall have sides tapered to blend with the contour of the slope.
4. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.

B. Anti-vortex vane - A36 steel.

2.2. ACCESSORIES

A. Concrete: 3000 psi (minimum), poured against undisturbed soil or compacted fill.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are ready to receive work.

3.2 PREPARATION

A. Hand trim excavations. Correct over-excavation according to the requirements of Section 02200 of this specification package.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Installation:
1. Excavate soil to a depth and width as shown on drawings.
2. Place corrugated steel pipe in properly excavated trench with bedding in place, as shown on the drawings, and properly compact backfill around pipe.

B. Bedding:
1. Place pipe on sand bedding material, Type A3 (per Section 02200), as indicated on drawings.
2. Backfill shall be placed in 6-inch layers and compacted to 95 percent as determined by ASTM D698. Puddling of backfill will not be allowed.
3. Maintain moisture content within ±3 percent of optimum moisture.

C. Backfill:
1. See Section 02667 for installation of backfill materials.

D. Aggregate:
1. ODOT Item 703.01, Size Number 57 as shown on the drawings.
2. ODOT 703.01 - Size Number 3 as shown on the drawings.

3.4 FIELD QUALITY ASSURANCE

A. Inspection: After the Subcontractor has performed the inspections, and prior to testing and backfill, the Subcontractor shall notify FERMCO.
1. Inspection shall include checking for proper alignment and location of all piping.
2. Joints shall be tight and properly seated to be acceptable to the FERMCO Construction Manager.
3. Inspection by the FERMCO Construction Manager is required prior to and immediately after placing backfill over pipe.
4. Piping must be free of debris, dirt, sand, silt, or other foreign matter.

B. The Subcontractor shall notify FERMCO of testing/inspection activities at least 24 hours prior to the start of all tests or inspections.

C. Testing of backfill compaction shall be as specified in Section 02200.

D. Excess debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

3.5 PROTECTION

A. Protect pipe from damage or displacement until backfilling operation is complete.

B. Excavation shall proceed in a manner to locate and protect existing underground utilities in the vicinity of construction.

C. Berms and Diversion Ditches: Miscellaneous berms and diversion ditches shall be provided to protect sloping areas from erosion:
   1. Located to direct runoff as required to prevent overflowing.
   2. Use hay bale check dams to filter out the suspended matter, as required.
   3. Filter fabric shall be placed under all riprap.

D. Protect storm drains and ditches from siltation during construction as specified in Section 02600. Storm drains and ditches shall be free of sediment and erosion problems at project completion.

E. Placing Topsoil:
   1. Spread topsoil to a depth of 4 inches (±1 inch) over areas to be seeded. Rake until smooth.
   2. Place topsoil on unsaturated, unfrozen subgrade.
   3. Remove vegetation matter and foreign non-organic material from topsoil while spreading.
   4. Grade topsoil to eliminate rough, low, or soft areas and to ensure positive drainage.

F. Debris and Waste:

1. Debris and waste generate as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

END OF SECTION

SECTION 02830
CHAIN LINK FENCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fence framework, fabric, and accessories.

B. Excavation for post bases and concrete foundation for posts.

C. Specification applies to fence repair needed as a result of subcontractor's construction or demolition activities.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02200 - Earthwork.

C. Section 16170 - Grounding and Bonding.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):

1.	ASTM A123 Rev. A-89	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
2.	ASTM A153-82	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3.	ASTM A121-92	Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire (AASHTO M280).

4.	ASTM A392 Rev. B-91	Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
5.	ASTM A569/A569M Rev. A-91	Standard Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
6.	ASTM F567-93	Standard Practice for Installation of Chain-Link Fence.
7.	ASTM C94-94	Ready Mixed Concrete.

1.5 SYSTEM DESCRIPTION

A. Fence Height: 7 feet nominal with barbed wire 1 foot high on extension arms as indicated on drawings.

B. Line Post Spacing: At intervals not exceeding 10 feet.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Material shall be stored at a location directed by FERMCO.

1.7 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.

C. Product Data: Provide data on fabric, posts, accessories, fittings, and hardware.

D. Certificate of Conformance: Manufacturer certifies that supplied products meet or exceed specification requirements.

E. As-built Drawings: Indicate plan layout, size, and type.

1.8 PROJECT CONDITIONS

A. Qualifications

1. Manufacturer: Company specializing in manufacturing the products specified in this section shall have a minimum of 3 years of related experience.

PART 2 PRODUCTS

2.1 MATERIALS

A. Framing (Steel): ASTM A569; hot rolled steel strip, cold formed to pipe configuration, longitudinally welded construction, minimum yield strength of 50 ksi.

B. Fabric Wire (Steel): ASTM A392 zinc-coated, 9-gage, wire fabric.

C. Barbed Wire: ASTM A121 galvanized steel; 12-gage wire, three strands, four points at 5 inches on center.

D. Concrete: ASTM C94; Normal Portland cement, 3,000 psi strength at 28 days, 3-inch slump; 1-1/2 inch nominal sized coarse aggregate.

E. Fittings: Galvanized steel sleeves, bands, clips, rail ends, tension bars, fasteners, and fittings.

F. Drive Anchor: Two angles, 36-inch length, 1-1/4 inch by 1-1/4 inch by 1/4 inch.

2.2 COMPONENTS

A. Line Posts: 2-3/8 inch outside diameter (OD).

B. Corner and Terminal Posts: 2-7/8-inch, OD.

C. Top and Brace Rail: 1-5/8-inch OD, plain end, sleeve coupled.

D. Fabric: 2-inch diamond mesh interwoven wire, No. 9 gage, top selvage twisted tight, bottom selvage knuckle end closed.

E. Tension Wire: No. 6 gage steel, single strand, galvanized.

F. Tie Wire: No. 6 gage galvanized steel.

G. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

2.3 FABRICATION

A. Finishes on new items
1. Components and Fabric: Galvanized to ASTM A123, 2.0 ounces/square foot coating.
2. Hardware: Galvanized to ASTM A153, 2.0 ounces/square foot coating.
3. Accessories: Same finish as framing.

PART 3 EXECUTION

3.1 ERECTION/INSTALLATION/APPLICATION

A. Install framework, fabric, accessories, and gates in accordance with manufacturer's instructions and ASTM F567.

B. Set all posts plumb. All corner and pull posts shall be set in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff. All line posts shall be set using steel drive anchors. The post shall be driven into solid ground and then anchored into position by two angles driven diagonally through metal shoes bolted to the post below ground level. Set angles perpendicular to the fence line.

C. All Post Footing Depth Below Finish Grade: 3 feet, 6 inches as shown on construction drawings.

D. Brace corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.

E. Provide top rail through line post tops and splice with 6-inch-long rail sleeves.

F. Stretch fabric between terminal posts.

G. Position bottom of fabric 2 inches above finished grade.

H. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

I. Attach fabric to end and corner posts with tension bars and tension bar clips.

J. Install bottom tension wire stretched taut between terminal posts.

K. Make adaptations of existing fence to new fence as required at places where existing and new fences meet.

L. Install grounding as indicated.

3.2 FIELD QUALITY ASSURANCE

A. Construction shall be accomplished in a manner that will provide a fence conforming to the surface of the ground.

3.3 ADJUSTING

A. Erection Tolerances
   1. Maximum Variation from Plumb: 1/4 inch.
   2. Maximum Offset from True Position: 1 inch.

B. Patch, repair, or replace any material damaged by the Subcontractor to match undamaged material.

C. Excess debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

END OF SECTION

SECTION 02900
SEEDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Seed and mulch to stabilize disturbed areas.

B. Maintenance of seeded areas until final acceptance of contract work.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02100 - Site Clearing and Demolition.

C. Section 02200 - Earthwork.

D. Section 02600 - Storm Drainage.

1.3 REFERENCE DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. State of Ohio, Department of Transportation (ODOT), Construction and Material Specifications, January 1, 1995.

1.	ODOT 207	Temporary Soil Erosion and Sediment Control.
2.	ODOT 659	Seeding and Mulching.
3.	ODOT 659.02	Agricultural Liming Materials.
4.	ODOT 659.06	Mulching Material.
5.	ODOT 659.08	Fertilizing and Liming.
6.	ODOT 670	Erosion Protection.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Maintenance Data: Submit maintenance instructions for seeded areas including:
   1. Grass Seed: Types, application, cutting method, and maximum grass height.
   2. Soil Nutrients: Types, frequency, and recommended coverage.
   3. Soil Conditioners: Type and recommended coverage.

C. Certificates: Provide written certification from supplier of seed to state that the seed delivered to the project complies with the following:
   1. Seed varieties and mixture comply with requirements of the specifications.
   2. Purity and germination rate comply with the requirements of the specifications.

D. Product Data:
   1. Filter fabric catalog data and sample.
   2. Mulch for seeding.

1.6 GENERAL

A. Except as supplemented or otherwise modified herein and/or shown on the construction drawings, the entire work under this section shall be in compliance with the provisions of ODOT Items 659 and 670.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in original, sealed containers. Seed in damaged packaging will not be accepted. Containers shall show:
   1. Names and percentage of each seed variety.
   2. Year of production, percentage of purity, minimum germination rate, and date of packaging.
   3. Net weight.

B. Deliver plant nutrients and soil conditioners in waterproof bags showing weight, chemical analysis, and name of manufacturer.

C. Store materials in a dry area, free from wetting and physical damage.

1.8 MAINTENANCE

A. Seed Areas:
1. Mowing: Prior to acceptance, the Subcontractor shall be responsible for mowing all grass to a height of 3 inches when the grass has reached a height of 5 inches. Seeded areas shall be cut at least three times, none of which shall be closer than 10 days apart.
2. Apply plant nutrients as required in recommendations of agricultural authority such as the Soil Conservation Service.
3. Water to prevent grass and soil from drying out.
4. Immediately re-seed areas that show bare spots. Fill in washed-out areas with topsoil and re-seed.

B. Removal of Sedimentation Accumulation:
1. Remove accumulated sediments when sediment is greater than one-half the height of the control measure, and at project completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. Seed
1. Seed Mixture: Permanent seeding
   a. Forty percent Kentucky Bluegrass (POA Pratensis).
   b. Forty percent Kentucky Fescue (Festuca Rubra).
   c. Twenty percent Annual Ryegrass (Lolium Multiflorum).
2. Mixture shall be clean, guaranteed 95 percent pure, and have a minimum germination rate of 85 percent within 1 year of test.

B. Soil Conditioners

1. Lime:

a. Lime shall meet the requirements of ODOT Item 659.02.

b. Agricultural ground limestone, with a minimum total neutralizing power (TNP) of 90 percent, at least 40 percent passing a No. 100 sieve, and at least 35 percent passing a No. 8 sieve, is considered to be standard grade. This grade is applied at a 100 percent standard application rate of 2,000 pounds per acre subject to the approval of FERMCO. Other grades of agricultural liming materials may be used. Apply substitute material at rates which are dependent on the TNP and sample fineness.

C. Plant Nutrients

1. Fertilizer:

a. Fertilizer shall meet the requirements of ODOT Item 659.08.

b. The standard application of fertilizer shall be at the rate of 20 pounds per 1,000 square feet of 12-12-12. Another analysis, in the same ration, may be used by varying the application rate to produce the same values specified. Either dry or liquid fertilizer may be used and shall be distributed in an even pattern over the specified area, then thoroughly disked, harrowed, or raked into the soil to a depth between 2 and 4 inches.

2.2 ACCESSORIES

A. Mulch:

1. Mulch shall meet the requirements of ODOT Item 659.06.

2. Materials used for mulching shall be straw or hay. They shall be reasonably free of weed seed and such foreign materials as may detract from their effectiveness as a mulch or injure desired plant growth.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove debris, weeds, and undesirable plants and their roots. Remove contaminated subsoil.

B. Repeat cultivation in areas where equipment used for hauling and spreading of topsoil has compacted subsoil.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Application of Soil Conditioners:
1. Apply lime conditioners at the rate specified in Article 2.1, Paragraph B, Subparagraph 1.b., or as determined by soil test.
2. Mix thoroughly into the top 2 inches of the topsoil.

B. Application of Plant Nutrients:
1. Apply fertilizer at the rate specified in Article 2.1, Paragraph C, Subparagraph 1.b.
2. Apply after smooth raking of topsoil, and prior to roller compaction.
3. Mix thoroughly into upper 2 inches of topsoil.
4. Lightly water to aid the distribution of fertilizer.

C. Seeding:
1. When applying seed with a mechanical spreader, apply evenly in two intersecting directions. Rake in lightly. Apply at a minimum rate of 3 pounds per 1,000 square feet.
2. Do not seed areas in excess of that which can be mulched on same day.
3. Apply seed mixture as follows:
   a. All seeding performed between October 15 and March 15 shall be temporary seeding in accordance with ODOT Item 207.
   b. Permanent seeding may be performed at any time with permission of FERMCO.
4. Lightly roll seeded area.

5. Immediately following seeding and compacting, apply much.
6. Apply water with a fine spray immediately after each area has been mulched. Saturate soil to approximately 4 inches deep.

3.3 FIELD QUALITY ASSURANCE

A. Subcontractor shall notify FERMCO at least 24 hours prior to date of anticipated inspection.
   1. To qualify for acceptance, an area shall have a good, clean stand of perennial grass.
   2. Coverage shall be at least 95 percent of the area, and no bare spots shall exceed 3 square feet.
   3. Areas that fail to meet requirements of the specifications shall be repaired or re-seeded as necessary to produce an acceptable stand of grass.

B. Excess debris and waste generated as a result of the work shall be containerized by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

3.4 PROTECTION

A. Seed Protection:
   1. Apply protection as necessary to retain soil and plant material.
   2. Cover seeded slope area with mulch. Cover ditch lines with matting.
   3. Where slope is steeper than 3 horizontal to 1 vertical, replace mulch with matting.
   4. Mulch:
      a. Mulch seeded area with straw mulch. Spread mulch at a rate of not less than 2 tons per acre.
      b. Apply by hand, by mechanical spreaders, or by blowers.

5. Matting:
   a. Roll matting onto slopes or along ditch lines without stretching or pulling.
   b. Lay matting smoothly on surface, and bury top end of each section in 6-inch-deep excavated topsoil trench.
   c. Provide 12-inch overlap of adjacent rolls.
   d. Rake smooth, level with adjacent soil.
   e. Secure outside edges and overlap with staples at a maximum interval of 36 inches. Intermediate staples shall be spaced at a maximum interval of 5 feet.
   f. Lightly dress slopes with topsoil to ensure close contact between matting and soil.
   g. At sides of ditches, lay matting laps in direction of water flow.

END OF SECTION

SECTION 16118
UNDERGROUND DUCTBANKS, DUCTS, AND MANHOLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Conduit.

B. Manholes.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 02200 - Earthwork.

1.3 RELATED DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. American National Standards Institute (ANSI):
1. ANSI C80.1-90 Rigid Steel Conduit - Zinc-Coated.

B. Institute of Electrical and Electronic Engineers (IEEE):
1. IEEE C2-93 National Electrical Safety Code.

C. National Fire Protection Association (NFPA):
1. NFPA 70-93 National Electrical Code.

D. American Society for Testing and Materials (ASTM):
1. ASTM A48-A94 Standard Specifications for Gray Iron Castings.

E. American Association of State Highway and Transportation Officials (AASHTO):

1.	AASHTO-92	Standard Specification for Highway Bridges.

F. National Electrical Manufacturers Association (NEMA):

1.	NEMA TC 3-90	PVC Fittings for Use with Rigid PVC Conduit and Tubing.
2.	NEMA TC 6-90	PVC and ABS Plastic Utilities Duct for Underground Installation.

G. Underwriters Laboratories, Inc. (UL):

1. Electrical Construction Materials Directories, 1994.

H. Ohio Department of Transportation (ODOT):

1.	Item 499-95	Concrete.
2.	Item 625-95	Highway Lighting.

1.5 SUBMITTALS

A. Provide submittals as required by Section 01010.

B. Shop Drawings: Indicate dimensions, reinforcement, size and locations of openings, and accessory locations for precast manholes.

C. Accurately record actual locations of exact routing of ductbank by field survey.

D. Accurately record actual locations of each manhole and conduit stub-up by field survey.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum 3 years experience.

B. Conform to requirements of NFPA 70 and IEEE C2.

C. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.8 PROJECT CONDITIONS

A. Verify routing and termination locations of ductbank with FERMCO Construction Manager prior to excavation for rough-in.

B. Verify locations of manholes and conduit stub-ups prior to excavating for installation.

1.9 DEFINITION

A. In the text of this section, the words conduit and duct are used interchangeably.

PART 2 PRODUCTS

2.1 MATERIALS

A. Rigid Steel Conduit: ANSI C80.1.

B. Plastic Utilities Duct: NEMA TC 6; PVC.

C. Plastic Utility Duct Fittings: NEMA TC 3.

D. Precast Concrete Manholes:
   1. Material: Reinforced precast concrete.
   2. Construction: Modular sections with tongue-and-groove joints.
   3. Reinforcing: AASHTO loading H-20, according to AASHTO-92.

4. Shape: Rectangular with truncated corners.
5. Nominal Inside Dimensions: 7 feet by 5 feet.
6. Inside Depth: 6-1/2 feet or as indicated.
7. Wall Thickness: 8 inches or as indicated.
8. Base Section: Include sump, dimensioned as indicated, with cast sleeve, and two 1-inch ground rod openings.
9. Top Section: Include grooved opening for frame and cover, dimensioned as indicated.
10. Riser Casting: 6-inch, with manhole step cast into frame.
11. Duct Entry Provisions: Window knockouts.
12. Duct Entry Locations: As indicated.
13. Duct Entry Size: For 5-inch, nominal conduit/end bells.

2.2 ACCESSORIES

A. Underground Warning Tape: 4-inch-wide plastic tape, colored yellow with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavation, base material installation, and compaction are completed.

3.2 PREPARATION

A. Prepare excavation in accordance with manhole manufacturer's instructions and requirements of Section 02200.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Underground Duct:
1. Install power duct 30 inches (minimum) below finished grade.
2. Install duct with minimum slope of 4 inches per 100 feet. Slope duct away from building entrances.

3. Cut duct square using saw or pipe cutter; de-burr cut ends.
4. Insert duct to shoulder of fittings; fasten securely.
5. Join nonmetallic duct using adhesive as recommended by manufacturer.
6. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
7. Install no more than equivalent of three 90-degree bends between pull points.
8. Provide suitable fittings to accommodate expansion and deflection where required.
9. Terminate duct at manhole entries using end bell.
10. Stagger duct joints vertically in concrete encasement 6 inches minimum.
11. Use suitable separators and chairs installed not greater than 4 feet on centers.
12. Band ducts together before placing concrete.
13. Securely anchor duct to prevent movement during concrete placement.
14. Concrete shall be ODOT Specification 499.03, Class C, placed according to 625.13. Use mineral pigment to color concrete red. Concrete shall have a 28-day compressive strength of 3,000 psi.
15. Provide minimum 3-inch concrete cover at bottom, top, and sides of ductbank. Provide minimum 3-inch separation between ducts.
16. Connect to manhole wall using dowels.
17. Provide pull rope in each duct except sleeves and nipples. Minimum 1/2-inch, 4,000 psi tensile strength polypropylene.
18. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.
19. Perform excavations and backfill trenches under provisions of Section 02200 of this specification package.
20. Interface installation of underground warning tape with backfilling. Install tape 6 inches below finished surface.
21. All duct end bells and exposed portions (stub-ups) of duct in manholes or above grade shall be rigid

steel. All final 90-degree bends from underground to stub-ups shall be rigid steel. Stub-ups shall be 3 inches above grade or floor.

22. Direct buried duct, not encased in concrete, shall conform to the above requirements, except those pertaining to concrete, and to the following requirements:
    a. Excavate trenches for the duct, depths as indicated, not less than 12 inches wide. Bends in trenches shall have a radius of not less than 36 inches.
    b. When rock is encountered, remove to a depth of at least 3 inches below the duct and fill the space with sand or clean earth free from particles larger than 1/4 inch.
    c. Use PVC conduit under concrete slabs; use rigid steel conduit for portions not covered by slabs.

B. Precast Manhole Installation:
    1. Install and seal precast sections in accordance with manufacturer's instructions.
    2. Install manholes plumb.
    3. Use precast neck and shaft sections to bring manhole cover to finished elevation.
    4. Attach cable racks to inserts after manhole installation is complete.

END OF SECTION

SECTION 16170
GROUNDING AND BONDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.2 RELATED SECTIONS

A. Section 01010 - General Requirements.

B. Section 16118 - Underground Duct Banks, Ducts, and Manholes.

1.3 RELATED DRAWINGS

A. See Section 01011 for the Schedule of Drawings.

1.4 REFERENCES

A. National Fire Protection Association (NFPA):
1. NFPA 70-93 National Electrical Code.

B. Underwriters Laboratories, Inc. (UL):
1. Electrical Construction Materials Directories, 1994.

C. International Electrical Testing Association (NETA):
1. NETA ATS-95 Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.5 SYSTEM DESCRIPTION

A. Periphery grounding conductor.

B. Concrete-encased grounding conductor.

C. Rod electrode.

D. Grounding System Resistance: 5 ohms maximum.

E. Fence Grounding.

1.6 SUBMITTALS

A. Provide submittals according to Section 01010.

B. Test Reports: Indicate overall resistance to ground and resistance of each electrode to ground.

1.7 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum 3 years experience.

B. Conform to requirements of NFPA 70.

C. Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and shown.

D. Provide certification of ground resistance testing instrumentation according to NETA ATS.

1.8 PROJECT CONDITIONS

A. Accurately record actual locations of grounding electrodes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Mechanical Connectors
1. Burndy.
2. Ideal.

3. Ilsco.
4. Other manufacturers shall be acceptable.

2.2 MATERIALS

A. Mechanical Connectors
1. Bronze.

B. Wire
1. Stranded copper.
   a. Periphery Grounding Conductor: #4/0 AWG.
   b. Grounding Conductor: Size to meet NFPA 70 requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that final backfill and compaction have been completed before driving rod electrodes.

3.2 ERECTION/INSTALLATION/APPLICATION

A. Install products in accordance with manufacturer's instructions.

B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

C. Provide bonding to meet NFPA 70 requirements.

D. Fence Grounding: Fences shall be grounded with a ground rod at each fixed gate post and at each corner post:
1. Drive ground rods until the top is 12 inches below grade.
2. Attach a No. 4 AWG copper conductor, by fusion weld process, to the ground rods and extend it underground to the immediate vicinity of the fence post.
3. Lace the conductor vertically into 12 inches of fence mesh and fasten it by two approved bronze

compression fittings, one to bond the wire to the post and the other to bond the wire to the fence. Each gate section shall be bonded to its gatepost by a 1/8-inch by 1-inch flexible braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

3.3 FIELD QUALITY ASSURANCE

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation as defined by contract documents and manufacturer's instructions. Accurately record as-built locations of grounding electrodes where different from drawings, and submit to the FERMCO Construction Manager. Test instrumentation shall conform to NETA ATS. Provide certification for instrumentation.

B. Measure the system's resistance to the ground; perform testing in accordance with instrument manufacturer's recommendations using the fall-of-potential method. Provide written test reports indicating overall resistance to ground and resistance of each electrode to ground.

END OF SECTION

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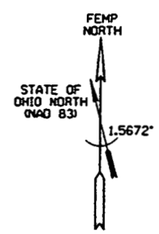
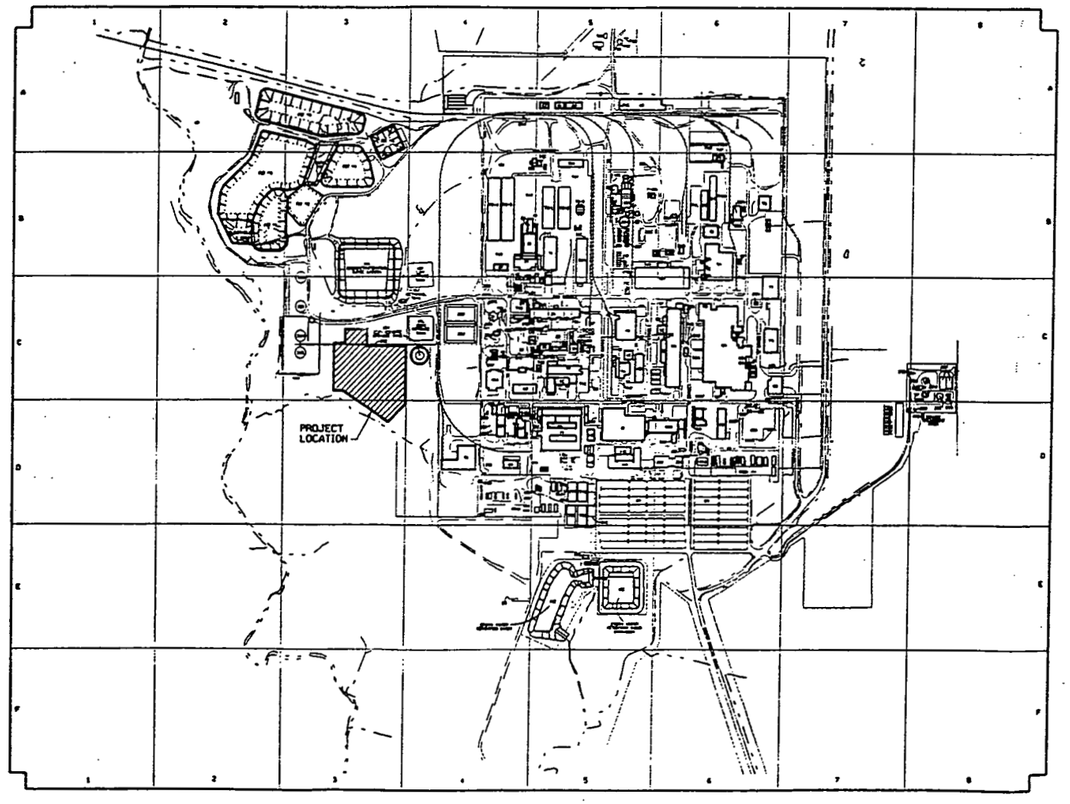
UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

SITE PREPARATION/UNDERGROUND UTILITIES

OPERABLE UNIT 4 - PROJECT ORDER 146





PARSONS

The Ralph M. Parsons Company • Parsons Main, Inc. • Engineering-Science, Inc.

ARCHITECTS - ENGINEERS
CINCINNATI, OHIO

NOTES

5 5 134

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX

000100

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	ISSUED FOR 90% DESIGN REVIEW	N/A

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
PROJECT TITLE SHEET

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
R. LINDGREN	07-28-95			K. GERARD	8/15/95
PLANTBOOK NO.		FLOOR		SCALE	SCALES
				NONE	
SUBMITTED FOR APPROVAL		TECHNICAL DIV. APPROVAL			
		N/A		N/A	
DATE		DATE			

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DOE PROJECT NO.	FEMP PROJECT NO.	DRAWING INDEX CODE NO.	SHEET NO.	REV. NO.
CRU4/P0146		WBS 1.1.1.1.4.3 00-90701	94X-5900-X-00925	X0001	A

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INDEX OF DRAWINGS

INDEX CODE NO.	DRAWING NO.	SHEET NO.	REVISION NO.	DRAWING TITLE	REMARKS
	94X-5900-X-00925	X0001	A	PROJECT TITLE SHEET	
	94X-5900-X-00926	X0002	A	DRAWING INDEX	
	94X-5900-X-00927	X0003	A	LEGEND AND SYMBOLS	
	94X-5900-C-00899	C0001	B	CIVIL - SITE PLAN - PLANT LAYOUT AND ACCESS	
	94X-5900-C-00898	C0002	B	CIVIL - UTILITY PLAN - LAYOUT OF UTILITIES AND TIE-INS	
	94X-5900-C-00906	C0003	A	CIVIL - GRADING AND DRAINAGE PLAN	
	94X-5900-C-00908	C0004	A	CIVIL - STORM DRAIN PROFILES	
	94X-5900-C-00909	C0005	A	CIVIL - WATER LINE PROFILES	
	94X-5900-C-00910	C0006	A	CIVIL - SANITARY SEWER AND UTILITY PROFILES	
	94X-5900-C-00902	C0007	A	CIVIL - DETAILS - SHEET 1 OF 2	
	94X-5900-C-00903	C0008	A	CIVIL - DETAILS - SHEET 2 OF 2	
	94X-5900-C-00911	C0009	A	CIVIL - SANITARY SEWER DETAILS	
	94X-5900-C-00913	C0010	A	CIVIL - STORMWATER MANAGEMENT DETAILS - SHEET 1 OF 2	
	94X-5900-C-00912	C0011	A	CIVIL - STORMWATER MANAGEMENT DETAILS - SHEET 2 OF 2	
	94X-5900-C-00924	C0012	A	CIVIL - WATER LINE DETAILS	
	94X-5900-F-00919	F0001	B	MECHANICAL PROCESS - UTILITY FLOW DIAGRAM - UNDERGROUND UTILITIES	
	94X-5900-M-00921	M0001	B	MECHANICAL PROCESS - PIPING AND INSTRUMENTATION DIAGRAM - SYMBOLS AND LEGEND SHEET	
	94X-5900-M-00920	M0002	B	MECHANICAL PROCESS - PIPING AND INSTRUMENTATION DIAGRAM - UNDERGROUND UTILITIES	
	94X-5900-E-00938	E0001	A	ELECTRICAL - ELECTRICAL SITE PLAN - UNDERGROUND DUCTBANK ROUTING	

NOTES

134

000101

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	ISSUED FOR 90% DESIGN REVIEW	RVB

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

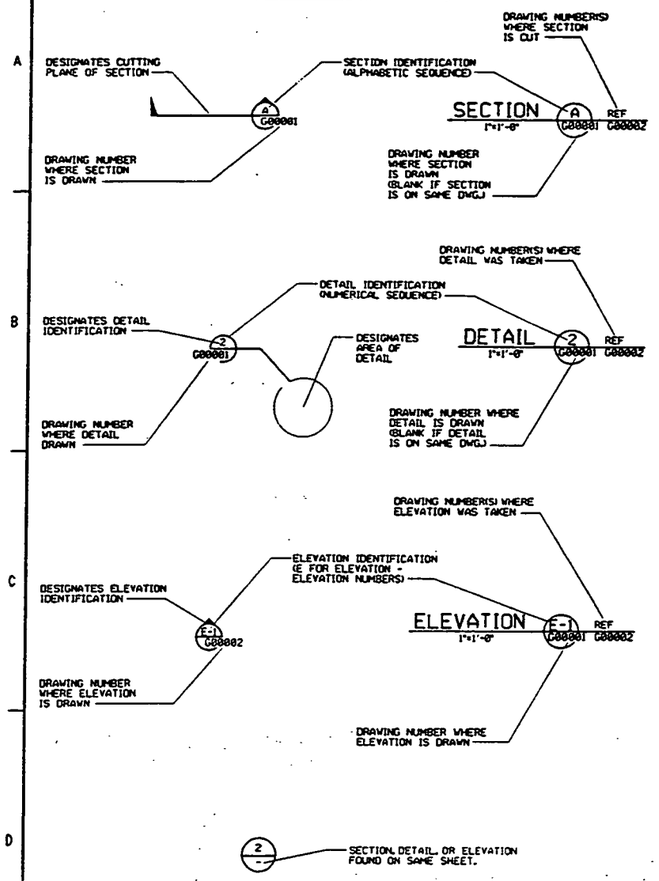
DRAWING TITLE
DRAWING INDEX

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
R. LINDGREN	07-28-95			K. GERARD	08/15/95
PLANT/MISC. NO.		FLOOR		SCALE	CLASS
				NONE	
SUBMITTED FOR APPROVAL		FERNCO QAU APPROVAL			
		N/A		N/A	

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DOE PROJECT NO.	COMP PROJECT NO.	DRAWING BLOCK CODE NO.	SHEET NO.	REV. NO.
CRU4/PO146		WBS 1.1.1.4.3 00-90701	94X-5900-X-00926	X0002	A

R94x00927.m(7297.ws104) po146@ws104. Fri Aug 25 13:08:03 CDT 1995

GENERAL LEGEND



NOTE:

ABBREVIATED DRAWING NUMBERS WILL BE USED FOR ALL SECTIONS, DETAILS, ELEVATIONS, AND WITHIN NOTES AND CALL OUTS IN THE BODY OF THE DRAWING.

FOR EXAMPLE: 95X-5900-G-00002 = DRAWING NUMBER
G00002 = ABBREVIATED DRAWING NUMBER

DIMENSIONING:

DIMENSIONS AND/OR ELEVATIONS MARKED THUS (+/-) SHALL BE VERIFIED IN THE FIELD BY CONTRACTOR.

USE DIMENSIONS AS SHOWN, DO NOT SCALE.

NTS (NOT TO SCALE) IS SHOWN ONLY WHERE DIMENSION IS OBVIOUSLY OUT OF SCALE.

UTILITY SYMBOLS

EXISTING		PROPOSED
— — ST — —	STORM SEWER	—— ST ——
— — SN — —	SANITARY SEWER	—— SN ——
— — FG — —	FUEL GAS	—— FG ——
— — DW — —	DRINKING WATER	—— DW ——
— — FOI — —	FIRE PROTECTION	—— FOI ——
— — LS — —	LIVE STEAM	—— LS ——
— — WS — —	WATER SUPPLY	—— WS ——
— — WR — —	COOLING WATER RETURN	—— WR ——
— — TW — —	PROCESS WATER	—— TW ——
— — CE — —	CONTAMINATED WATER	—— CE ——
— — FT — —	FILTRATE OR EFFLUENT	—— FT ——
— — DF — —	DEIONIZED FEED	—— DF ——
— — PW — —	DEIONIZED WATER	—— PW ——
— — BR — —	BRINE	—— BR ——
— — RW — —	RAW WATER	—— RW ——
— — A — —	ALARM	—— A ——
— — CN — —	STEAM CONDENSATE	—— CN ——
— — VE — —	VENT LINES	—— VE ——
— — SD — —	SUB-SURFACE DRAINAGE	—— SD ——
— — SL — —	SUMP LIQUOR	—— SL ——
— — E — —	ELECTRICAL	—— E ——
— — OE —○—	OVERHEAD ELECTRICAL	—— OE —○—
— — T — —	TELEPHONE	—— T ——
— — G — —	ELECTRIC GROUND	—— G ——
— — PA — —	PLANT AIR	—— PA ——
— — SA — —	INSTRUMENT AIR SUPPLY	—— SA ——
.....	ABANDONED	

BALLOON LEGEND

- PIV — POST INDICATOR VALVE
- SMH — SANITARY MANHOLE
- EMH — ELECTRICAL MANHOLE
- TMH — TELEPHONE MANHOLE
- CB — STORM SEWER CATCH BASIN
- HPFH — HIGH PRESSURE FIRE HYDRANT
- LPFH — LOW PRESSURE FIRE HYDRANT
- FE — FLARED END SECTION

GRADING SYMBOLS

EXISTING		PROPOSED
X 584.9	SPOT ELEVATION	X 585.4
— — 584 — —	CONTOUR - MINOR	584
— — 585 — —	CONTOUR - MAJOR	585
(TOE)	SLOPE INDICATOR	(TOE)

ARCHITECTURAL LEGEND

EXISTING		PROPOSED
	DOOR NUMBER	103
	ROOM NUMBER	101

SYMBOLS LEGEND

EXISTING		PROPOSED
	POST INDICATOR VALVE (PIV)	
	FIRE HYDRANT (FH)	
	MANHOLE (MH)	S OR D
	CATCH BASIN (CB)	D
	LIGHT POLE	
	PIPE SUPPORT	
	ELECTRICAL MANHOLE	E
	TELEPHONE MANHOLE	T
	STREET WASHERS	
	VALVE BOX	
CB13	MONITORING WELL	
	SURFACE DRAINAGE FLOW	
	POWER POLE	
	GRAVEL ROADWAY/DRIVEWAY	
	ASPHALT ROADWAY/DRIVEWAY	
	CONCRETE PAD/ ROADWAY/DRIVEWAY	
	BUILDING/TRAILER	
	RAILROAD TRACK	
	OU BOUNDARY	
	FENCE	
	TREE LINE	
	DECIDUOUS TREE	
	CONIFEROUS TREE	
	CENTERLINE DRAINAGE DITCH	
	RIVER/CREEK	
	POLE TO BE RELOCATED	
	TO BE REMOVED	
	SILT FENCE	
	ELECTRICAL TRANSFORMER	T
	TRANSMISSION TOWER	
	HEADWALL	OR
BM	BENCH MARK	
	CONSTRUCTION/WIND BARRIER FENCE	
	SIGN	
	BOLLARD/GUARD POST	
PB	ELECTRICAL PULL BOX	
	SURVEY MONUMENT	
	ROAD CENTERLINE OR BASELINE	
	BEND	OR
	TEE	
	THRUST BLOCK	
W OR U	UNKNOWN	
	STRAW BALE SILT BARRIER	
	CHECK DAM	
	FENCE GATE	
	FLARED END SECTION	

NOTES

134

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX

G00102

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS	DATE
A	ISSUED FOR 90% DESIGN REVIEW	MB	

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

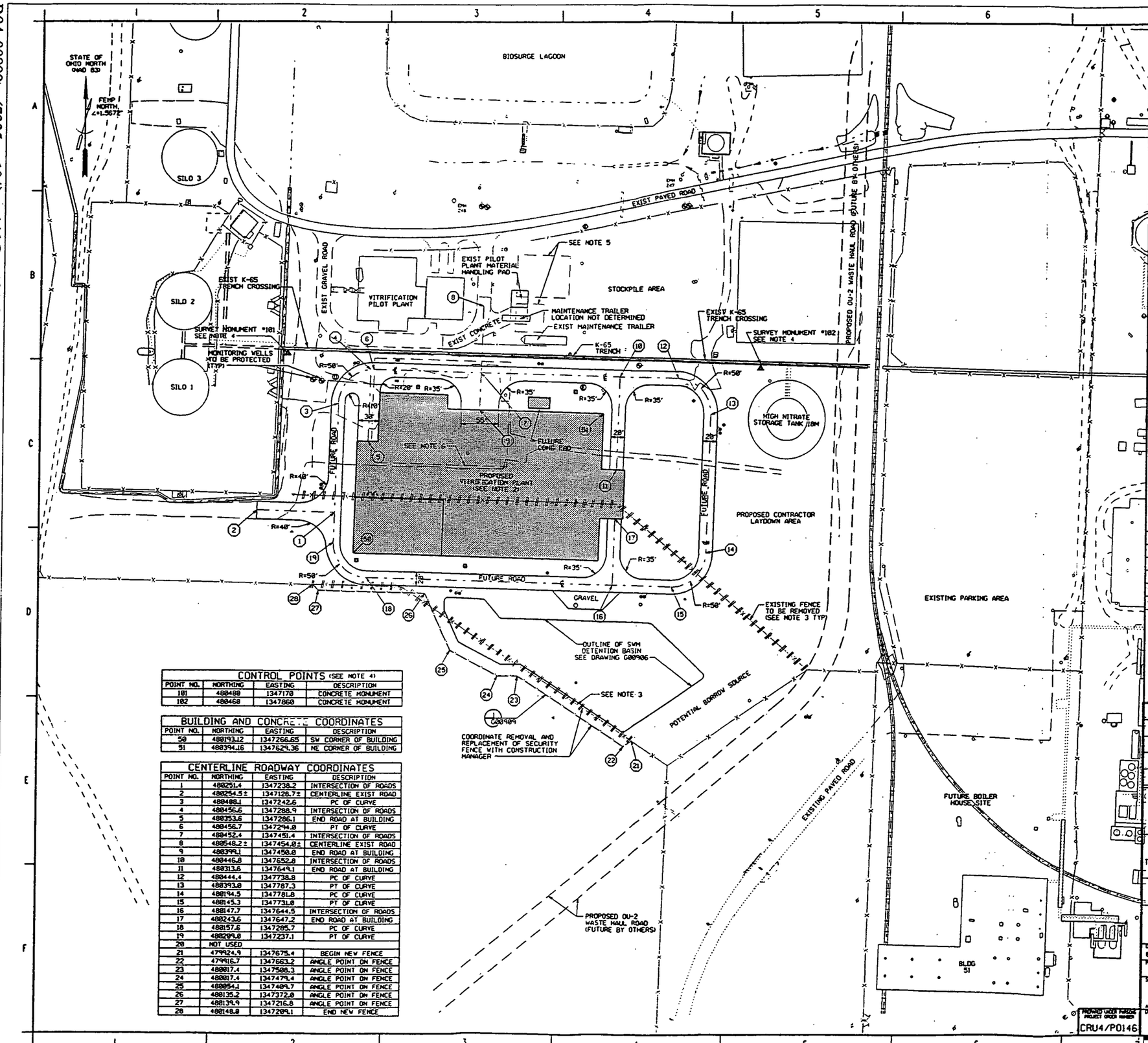
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
LEGEND AND SYMBOLS

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
R. LINDOREN	07-28-95			K. GERARD	8/15/95
PLOT/FILE NO.		FLOOR		SCALE	CLASS
				NONE	
SUBMITTED FOR APPROVAL		FERNCO QAI APPROVAL			
		N/A		N/A	
A/E PROJECT NO.	DATE		DOE PROJECT NO.		

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DOE PROJECT NO.	TEMP PROJECT NO.	DRAWING BLOCK CODE NO.	SHEET NO.	REV. NO.
CRU4/P0146		VBS 1.1.1.4.3 00-90701	94X-5900-X-00927	X0003	A

R94g00899.m(7335.ws104) po146@ws104. Sat Aug 26 10:59:05 CDT 1995



CONTROL POINTS (SEE NOTE 4)			
POINT NO.	NORTHING	EASTING	DESCRIPTION
101	480488	1347170	CONCRETE MONUMENT
102	480468	1347860	CONCRETE MONUMENT

BUILDING AND CONCRETE COORDINATES			
POINT NO.	NORTHING	EASTING	DESCRIPTION
50	480193.12	1347266.85	SW CORNER OF BUILDING
51	480394.16	1347629.36	NE CORNER OF BUILDING

CENTERLINE ROADWAY COORDINATES			
POINT NO.	NORTHING	EASTING	DESCRIPTION
1	480251.4	1347238.2	INTERSECTION OF ROADS
2	480254.5 ±	1347128.7 ±	CENTERLINE EXIST ROAD
3	480488.1	1347242.6	PC OF CURVE
4	480456.6	1347288.9	INTERSECTION OF ROADS
5	480353.6	1347286.1	END ROAD AT BUILDING
6	480456.7	1347294.8	PT OF CURVE
7	480452.4	1347451.4	INTERSECTION OF ROADS
8	480548.2 ±	1347454.8 ±	CENTERLINE EXIST ROAD
9	480399.1	1347450.8	END ROAD AT BUILDING
10	480446.8	1347652.8	INTERSECTION OF ROADS
11	480313.6	1347649.1	END ROAD AT BUILDING
12	480444.4	1347738.8	PC OF CURVE
13	480393.8	1347787.3	PT OF CURVE
14	480194.5	1347781.8	PC OF CURVE
15	480145.3	1347731.8	PT OF CURVE
16	480147.7	1347644.5	INTERSECTION OF ROADS
17	480243.6	1347647.2	END ROAD AT BUILDING
18	480157.6	1347285.7	PC OF CURVE
19	480209.8	1347237.1	PT OF CURVE
20	NOT USED		
21	479924.9	1347675.4	BEGIN NEW FENCE
22	479916.7	1347663.2	ANGLE POINT ON FENCE
23	480817.4	1347508.3	ANGLE POINT ON FENCE
24	480817.4	1347479.4	ANGLE POINT ON FENCE
25	480854.1	1347489.7	ANGLE POINT ON FENCE
26	480135.2	1347372.8	ANGLE POINT ON FENCE
27	480139.9	1347216.8	ANGLE POINT ON FENCE
28	480148.8	1347209.1	END NEW FENCE

NOTES

1. EXISTING CONDITIONS SHOWN ON THIS DRAWING WERE PREPARED FROM FEMP SITE PROVIDED DATA FROM THE DOCUMENTS LISTED BELOW.

   EXISTING SITE DATA SOURCE (IN PLANT FILES)
   PARSONS TOPOGRAPHY, 1992

   FEMP CADD GRID/UTILITY DRAWINGS
   FEMP CONTRACTOR PROJECT DESIGN DOCUMENTS
   FIELD SURVEY BY B. L. PAYNE & ASSOCIATES, INC., JULY 1995.
2. FACILITY SHOWN IS APPROXIMATE ONLY. ACTUAL CONFIGURATION AND SIZE TO BE DETERMINED.
3. CONTRACTOR SHALL REMOVE EXISTING FENCE AND SALVAGE TO THE EXTENT POSSIBLE FOR REUSE AT THE NEW LOCATION. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING SECURITY DURING FENCE REMOVAL AND ERECTION.
4. COORDINATES FOR SURVEY MONUMENTS 101 AND 102 ARE APPROXIMATE AND SHALL BE ESTABLISHED FOR HORIZONTAL AND VERTICAL CONTROL BY FERNCO PRIOR TO CONSTRUCTION. AS SURVEYED INFORMATION SHALL BE PROVIDED TO THE CONTRACTOR BY THE CONSTRUCTION MANAGER.
5. EXISTING SOIL STOCKPILES TO BE USED AS NEEDED DURING CUT AND FILL OPERATIONS.
6. EXISTING CONTRACTOR TRAILER AND LAYDOWN AREA TO BE RELOCATED BY OTHERS PRIOR TO CONSTRUCTION.
7. SEE DRAWING 94X-5900-G-00898 FOR MONITORING WELL NUMBERS AND UTILITIES.

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000103

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00898	LAYOUT OF UTILITIES AND TIE-INS
94X-5900-G-00986	GRADING AND DRAINAGE PLAN
94X-5900-G-00989	DETAILS - SHEET 2 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INIT.	FERNCO APPR.	DATE
B	ISSUED FOR 90% DESIGN REVIEW		BB	
A	PREPARED FOR 30% DESIGN REVIEW		BB	

DETAILS AND DATE

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

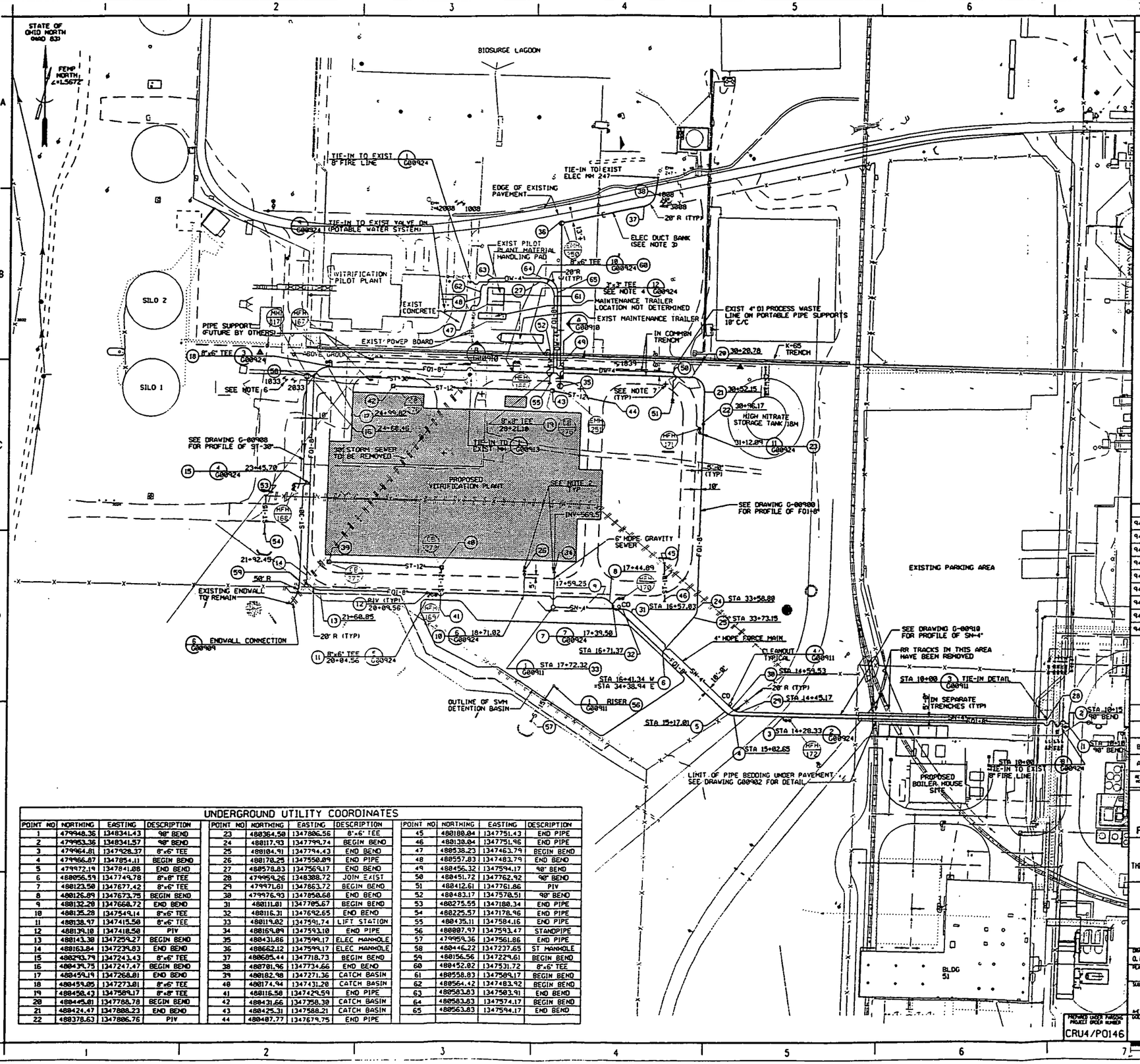
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
SITE PLAN
PLANT LAYOUT AND ACCESS

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
B. BABAYAN	6/16/95			K. GERARD	8/15/95
PLANT/BLDG. NO.	FLOOR			SCALE	CLASS
				1"=50'	
SUBMITTED FOR APPROVAL		FERNCO QAU APPROVAL			
		NA		NA	
INIT.	DATE		DATE		

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DOE PROJECT NO.	STSP PROJECT NO.	DRAWING SHEET CODE NO.	SHEET NO.	REV. NO.
CRU4/PO146		WBS 1.1.1.4.3 00-90701	94X-5900-G-00899	G0001	B

R94g00898.m(7333.ws104) po146@ws104. Sat Aug 26 10:36:49 CDT 1995



UNDERGROUND UTILITY COORDINATES

POINT NO	NORTHING	EASTING	DESCRIPTION
1	479948.38	1348341.43	90° BEND
2	479953.38	1348341.57	90° BEND
3	479964.81	1347526.37	8"x6" TEE
4	479966.87	1347854.11	BEGIN BEND
5	479972.19	1347841.88	END BEND
6	480056.59	1347749.78	8"x6" TEE
7	480123.58	1347677.42	8"x6" TEE
8	480126.89	1347673.75	BEGIN BEND
9	480132.20	1347668.72	END BEND
10	480135.28	1347549.14	8"x6" TEE
11	480138.97	1347415.58	8"x6" TEE
12	480139.10	1347418.58	PIV
13	480143.30	1347254.27	BEGIN BEND
14	480163.84	1347239.83	END BEND
15	480293.79	1347243.43	8"x6" TEE
16	480434.75	1347247.47	BEGIN BEND
17	480459.19	1347268.81	END BEND
18	480459.05	1347273.81	8"x6" TEE
19	480458.43	1347589.17	8"x8" TEE
20	480445.81	1347788.78	BEGIN BEND
21	480424.47	1347888.23	END BEND
22	480378.63	1347886.76	PIV
23	480364.58	1347886.56	8"x6" TEE
24	480117.93	1347799.74	BEGIN BEND
25	480104.91	1347794.43	END BEND
26	480178.25	1347550.89	END PIPE
27	480578.83	1347569.17	END BEND
28	479959.26	1348388.72	JOIN EXIST
29	479971.61	1347863.72	BEGIN BEND
30	479976.93	1347850.68	END BEND
31	480111.81	1347705.67	BEGIN BEND
32	480116.31	1347692.65	END BEND
33	480119.82	1347591.74	LIFT STATION
34	480169.89	1347593.10	END PIPE
35	480431.86	1347599.17	ELEC MANHOLE
36	480662.12	1347599.17	ELEC MANHOLE
37	480685.44	1347718.73	BEGIN BEND
38	480781.96	1347734.66	END BEND
39	480182.98	1347271.36	CATCH BASIN
40	480174.94	1347431.28	CATCH BASIN
41	480116.58	1347429.59	END PIPE
42	480431.66	1347358.38	CATCH BASIN
43	480425.31	1347588.21	CATCH BASIN
44	480487.77	1347679.75	END PIPE
45	480180.84	1347751.43	END PIPE
46	480138.84	1347751.96	END PIPE
47	480538.23	1347463.79	BEGIN BEND
48	480557.83	1347483.79	END BEND
49	480456.32	1347594.17	90° BEND
50	480451.72	1347762.92	90° BEND
51	480412.61	1347761.86	PIV
52	480483.17	1347570.51	90° BEND
53	480275.55	1347188.34	END PIPE
54	480225.57	1347178.96	END PIPE
55	480435.11	1347584.16	END PIPE
56	480807.97	1347593.47	STANDPIPE
57	479959.36	1347561.86	END PIPE
58	480446.22	1347237.65	ST MANHOLE
59	480156.56	1347229.61	BEGIN BEND
60	480452.02	1347531.72	8"x6" TEE
61	480558.83	1347589.17	BEGIN BEND
62	480564.42	1347483.92	BEGIN BEND
63	480583.83	1347583.91	END BEND
64	480583.83	1347574.17	BEGIN BEND
65	480563.83	1347594.17	END BEND

NOTES

1. EXISTING CONDITIONS SHOWN ON THIS DRAWING WERE PREPARED FROM FEMP SITE PROVIDED DATA FROM THE DOCUMENTS LISTED BELOW.
   EXISTING SITE DATA SOURCE (IN PLANT FILES)
   PARSONS TOPOGRAPHY, 1992
   FEMP CADD GRID/UTILITY DRAWINGS
   FEMP CONTRACTOR PROJECT DESIGN DOCUMENTS
   FIELD SURVEY BY B.L. PAYNE AND ASSOCIATES JULY 1995
2. END PROPOSED UTILITY LINES AT LOCATIONS SHOWN. UTILITY TIE-IN LOCATIONS TO THE FACILITY WILL BE DETERMINED AS PART OF FACILITY TITLE II DESIGN.
3. FOR ELECTRICAL DUCT BANK ARRANGEMENT, SEE ELECTRICAL DRAWING.
4. EXISTING 3" TV LINE AT K65 TRENCH IS AT A HIGHER ELEVATION THAN TRENCH BOTTOM AND IS NEXT TO TRENCH.
5. BELOW IS A SCHEDULE OF PIPING MATERIALS AND MINIMUM DEPTH TO BE USED:
   DW - HDPE SDR11, 42" MINIMUM DEPTH
   FD - HDPE SDR11, 48" MINIMUM DEPTH
   SN - HDPE SDR17, 36" MINIMUM DEPTH
   TV - HDPE SDR11, 36" MINIMUM DEPTH
6. EXISTING MONITORING WELLS TO REMAIN. CONTRACTOR TO PROTECT WELLS DURING CONSTRUCTION. ANY DAMAGE TO EXISTING WELLS CAUSED BY CONTRACTOR SHALL BE BROUGHT TO THE ATTENTION OF THE CONSTRUCTION MANAGER IMMEDIATELY.
7. EXISTING POWER/LIGHT POLES TO BE REMOVED OR RELOCATED PRIOR TO CONSTRUCTION. ANY DISRUPTION TO SERVICE TO BE COORDINATED WITH CONSTRUCTION MANAGER.

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000104

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	INDEX SHEET
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00908	UTILITY PROFILES SHEET 1 OF 2
94X-5900-G-00902	CIVIL - DETAILS - SHEET 1 OF 2
94X-5900-G-00908	STORM DRAIN PROFILES
94X-5900-G-00909	CIVIL - DETAILS - SHEET 2 OF 2
94X-5900-G-00910	SANITARY SEWER AND UTILITY PROFILE
94X-5900-G-00911	SANITARY SEWER DETAILS
94X-5900-G-00924	WATERLINE DETAILS

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INIT.	FERMCO ORG APPROVAL DETAILS AND DATE
B	ISSUED FOR 90% DESIGN REVIEW		
A	PREPARED FOR 30% DESIGN REVIEW		

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
UTILITY PLAN
LAYOUT OF UTILITIES AND TIE-INS

DRAWN BY	DATE	LEAD DRAFTER	DATE	CHECKED BY	DATE
O. BABAYAN	6/14/95			Y. AFSHAR	8/15/95
PLANT/BLDG. NO.		FLOOR		SCALE	CLASS
				1"=50'	
SUBMITTED FOR APPROVAL		FERMCO ORG APPROVAL		N/A	
		N/A			
QA	DATE				

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	CLIN PROJECT NO.	TEMP PROJECT NO.	DRAWING INDEX CODE NO.	SHEET NO.	REV. NO.
CRU4/P0146		WBS 1.1.1.4.3 00-90701	94X-5900-G-00898	G0002	B

R94g00906.m(7329.ws104) po146@ws104. Sat Aug 26 09:55:03 CDT 1995

STATE OF OHIO NORTH (NAD 83)

FEMP NORTH ∠=1.5672°

94 VITRIFICATION PILOT PLANT

18J HIGH NITRATE TANK

HIGH NITRATE STORAGE TANK 18M

PROPOSED VITRIFICATION PLANT FFE = 576.00

FFE = 574.00

SWM DETENTION BASIN

LIMIT OF FIELD RUN SURVEY

SURPLUS SOIL STOCKPILES TO BE USED IN GRADING ACTIVITIES

STOCKPILE AREA

EXIST PILOT PLANT MATERIAL HANDLING PAD

MAINTENANCE TRAILER LOCATION NOT DETERMINED

EXIST MAINTENANCE TRAILER

EXIST K-65 TRENCH CROSSING

SURVEY MONUMENT #101

SURVEY MONUMENT #102

CONC. CHANNEL

EXISTING CONSTRUCTION LAYDOWN AREA AND TRAILERS TO BE RELOCATED BY FERNCO

FUTURE CONC PAD BY OTHERS

GRAVEL AREA

TEMPORARY TOPSOIL STOCKPILE AREA

POTENTIAL ADDITIONAL BORROW SOURCE AREA (IF REQUIRED)

SEE NOTE 5.

SEE TABLE THIS SHEET FOR COORDINATES (TYP)

3:1 INTERIOR SLOPE (TYP)

TRANSITION FROM 3:1 SLOPE TO 2:1 SLOPE

100 YEAR SPILLWAY

TOP BERM 570.5

TOP BERM 570.8

PROFILE

EXIST CONCRETE

EXIST MH G00913 EXIST RIM 576.1 /PROP RIM 575.45 INV 566.68

NOTES

1. FINISH SUBGRADE UNDER BUILDING IS ASSUMED TO BE 1.0' BELOW FINISH FLOOR ELEVATION.
2. SWM DETENTION BASIN TO BE USED AS A SEDIMENT BASIN DURING CONSTRUCTION. CONTRACTOR TO REMOVE ALL SEDIMENT TO PROPOSED CONTOURS AT THE END OF CONSTRUCTION OR WHEN THE SEDIMENT ELEVATION REACHES THE SEDIMENT CLEANOUT ELEVATION (SEE DETAIL 3, DRAWING 94X-5900-G-00913.
3. INSTALL STRAW BALES AROUND CATCH BASINS AS SHOWN ON DRAWING 94X-5900-G-00902.
4. GRADES SHOWN ARE FINAL GRADES IN ALL AREAS, EXCEPT UNDER ROADS AND UNDER BUILDING FOOTPRINT. GRADES SHOWN UNDER ROADS AND BUILDING FOOTPRINT ARE TO SUBGRADE. THESE GRADES MAY NEED TO BE ADJUSTED WITH FINAL BUILDING DESIGN.
5. ALL SLOPES STEEPER THAN 3:1 SHALL BE PROTECTED WITH AN EROSION CONTROL BLANKET SIMILAR TO CURLEX-II. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

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STORMWATER MANAGEMENT BASIN			
POINT NO.	NORTHING	EASTING	DESCRIPTION
1	488114.4	1347416.3	565 ELEVATION
2	488112.9	1347452.4	565 ELEVATION
3	488095.3	1347476.1	565 ELEVATION
4	488079.2	1347695.9	565 ELEVATION
5	488019.6	1347760.3	565 ELEVATION
6	479954.4	1347663.8	565 ELEVATION
7	488049.8	1347517.7	565 ELEVATION
8	488049.8	1347487.2	565 ELEVATION
9	488077.8	1347433.7	565 ELEVATION

000105

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00902	DETAILS - SHEET 1 OF 2
94X-5900-G-00909	DETAILS - SHEET 2 OF 2
94X-5900-G-00908	STORM DRAIN PROFILES
94X-5900-G-00913	STORMWATER MANAGEMENT DETAILS - SHEET 1 OF 2
94X-5900-G-00912	STORMWATER MANAGEMENT DETAILS - SHEET 2 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	ISSUED FOR 90% DESIGN REVIEW	BA

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

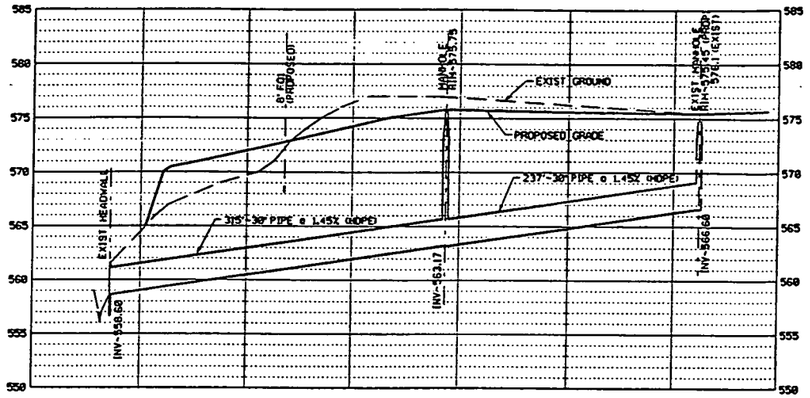
DRAWING TITLE
CIVIL
GRADING AND DRAINAGE PLAN

DRAWN BY	DATE	LEAD ENGINEER	DATE	DESIGNED BY	DATE
R. LINDGREN	6-28-95			K. GERARD	8/15/95
PLANT/BLDG NO.		FLOOR		SCALE	CLASS
				1"=30'	
SUBMITTED FOR APPROVAL		FERNCO CRU APPROVAL			
		NA		NA	
A-E DATE		DATE			

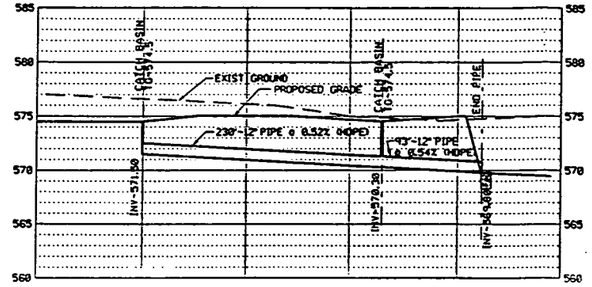
DOE PROJECT NO.	FEMP PROJECT NO.	DRAWING NUMBER CODE NO.	SHEET NO.	REV. NO.
	VBS LLLL4.3 00-90701	94X-5900-G-00906	G0003	A

PREPARED UNDER PARSONS PROJECT ORDER NUMBER: CRU4/P0146

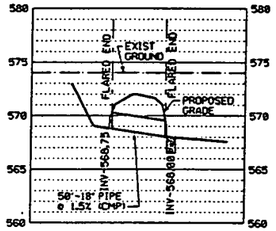
R94g00908.m(7305.ws104) po146@ws104. Fri Aug 25 14:32:01 CDT 1995



PROFILE (A) REF G00988 G00986
SCALE: HOR 1"=50' VER 1"=5'



PROFILE (B) REF G00988 G00986
SCALE: HOR 1"=50' VER 1"=5'



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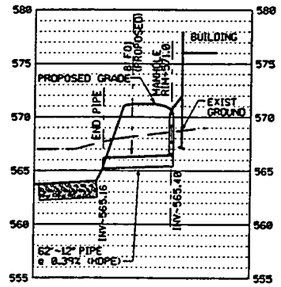
SCALE: HOR 1"=50' VER 1"=5'



PROFILE (D) REF G00988 G00986
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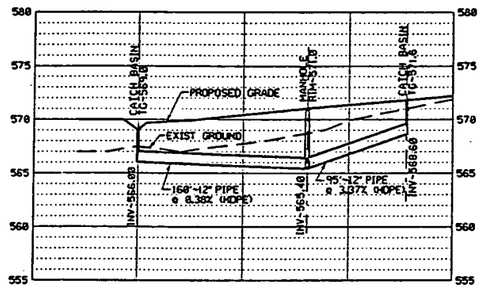
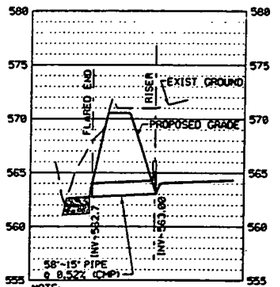
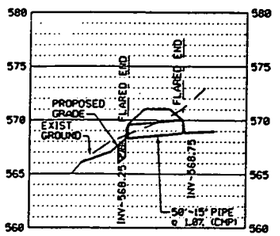


PROFILE (E) REF G00988 G00986
SCALE: HOR 1"=50' VER 1"=5'

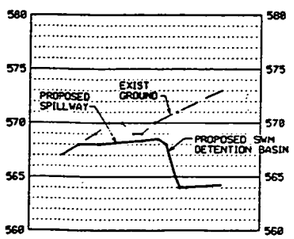


NOTE:
REFER TO SECTION @ .DWG G00913 FOR ADDITIONAL INFORMATION ON PIPE, BERM, AND RISER.

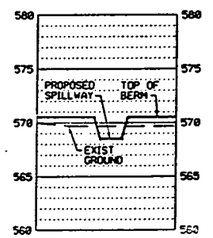
PROFILE (F) REF G00988 G00986
SCALE: HOR 1"=50' VER 1"=5'



PROFILE (G) REF G00988 G00986
SCALE: HOR 1"=50' VER 1"=5'



SECTION (A) REF G00988 G00986
SCALE: HOR 1"=50' VER 1"=5'



SECTION (B) REF G00988 G00986
SCALE: HOR 1"=50' VER 1"=5'

NOTES

ABBREVIATIONS

TG - TOP OF GRATE; FLAT GRATES OR FRAME ELEVATION FOR NON-FLAT GRATES.

134

000106

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00986	GRADING AND DRAINAGE PLAN
94X-5900-G-00913	STORMWATER MANAGEMENT DETAILS - SHEET 1 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	ISSUED FOR 98% DESIGN REVIEW	RR

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

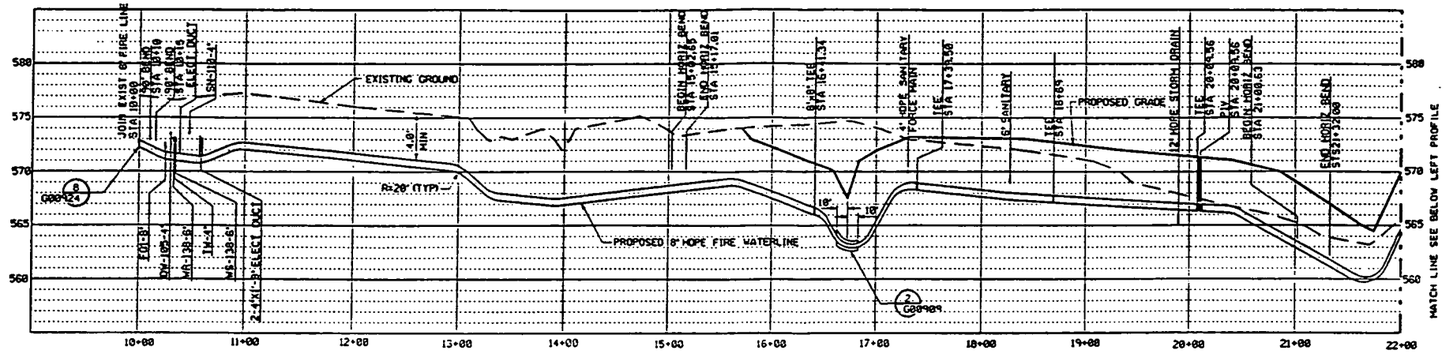
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
STORM DRAIN PROFILES

DRAWN BY	DATE	LEAD DRAWER	DATE	CHECKED BY	DATE
R. LINDGREN	7/1/95			K. GERARD	8/15/95
PLANT/BLDG NO.		FLOOR		SCALE	CLASS
				AS SHOWN	
SUBMITTED FOR APPROVAL		FERNCO CRU APPROVAL			
				NA	NA
DOE PROJECT NO.	DATE		DATE		

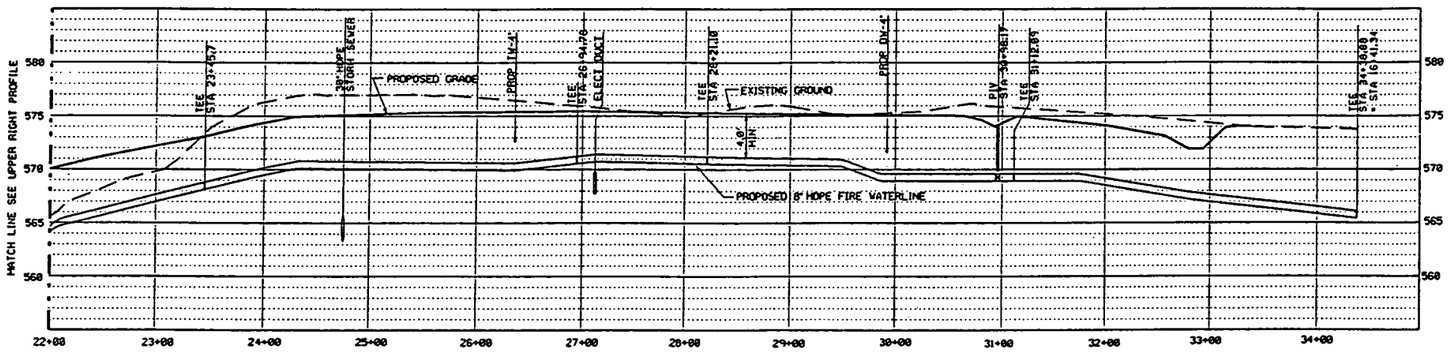
PROJECT ORDER PHASES PROJECT ORDER NUMBER	DOE PROJECT NO.	FDF PROJECT NO.	DRAWING TREE CODE NO.	SHEET NO.	REV. NO.
CRU4/PO146		WBS 1.1.1.4.3 00-90701	94X-5900-G-00908	G0004	A

R94g00900.m(7307.ws104) po146@ws104. Fri Aug 25 14:47:21 CDT 1995



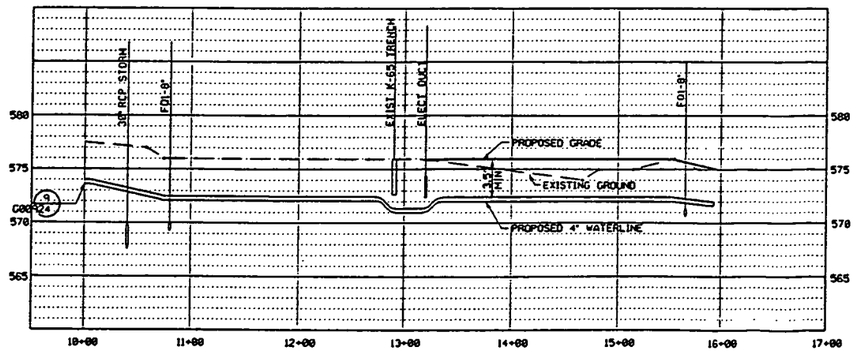
FQ1 - 8" FIRE WATER LINE PROFILE

SCALES: HORIZ 1"=50'-0" VERT 1"=5'-0" REF G00898



FQ1 - 8" FIRE WATER LINE PROFILE

SCALES: HORIZ 1"=50'-0" VERT 1"=5'-0" REF G00898



DW - 4" DRINKING WATER LINE PROFILE

SCALES: HORIZ 1"=50'-0" VERT 1"=5'-0" REF G00898

NOTES

134

000107

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00898	UTILITY PLAN
94X-5900-G-00924	WATER LINE DETAILS
94X-5900-G-00909	DETAILS - SHEET 2 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
A	ISSUED FOR 90% DESIGN REVIEW	

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

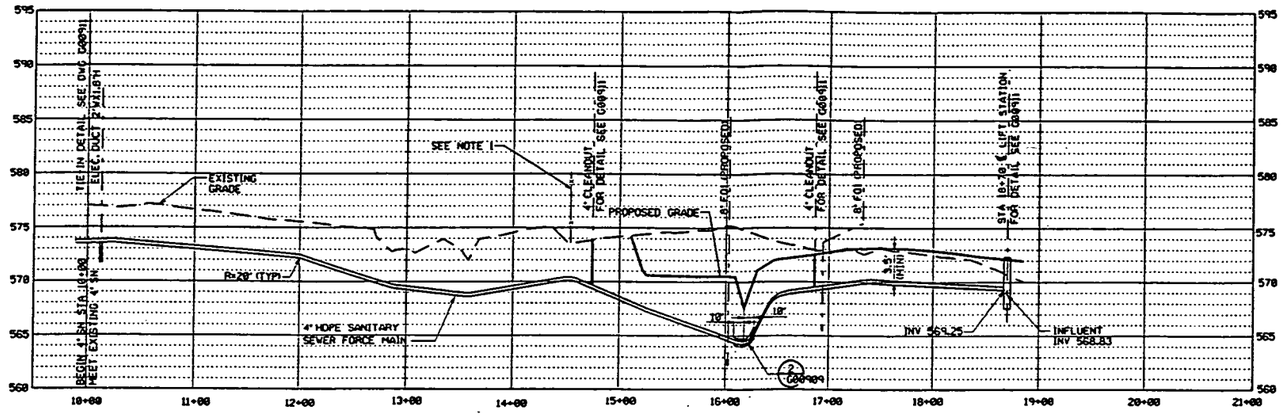
DRAWING TITLE
CIVIL
WATER LINE PROFILES

DRAWN BY	DATE	LEAD DRAWER	DATE	CHECKED BY	DATE
Q. BABAYAN	7/24/95			T. AFSHAR	8/15/95
PLANT/AREA NO.		FLOOR		SCALE	CLASS
				1"=50'	
SUBMITTED FOR APPROVAL		FENCO CAU APPROVAL			
		N/A		N/A	

A/E	DATE	DOE PROJECT NO.	FDF PROJECT NO.	DRAWING BOOK CODE NO.	SHEET NO.	REV. NO.
			WBS 1.1.1.4.3 00-90701	94X-5900-G-00900	G0005	A

PREPARED UNDER PARSONS PROJECT ORDER NUMBER: CRU4/PO146

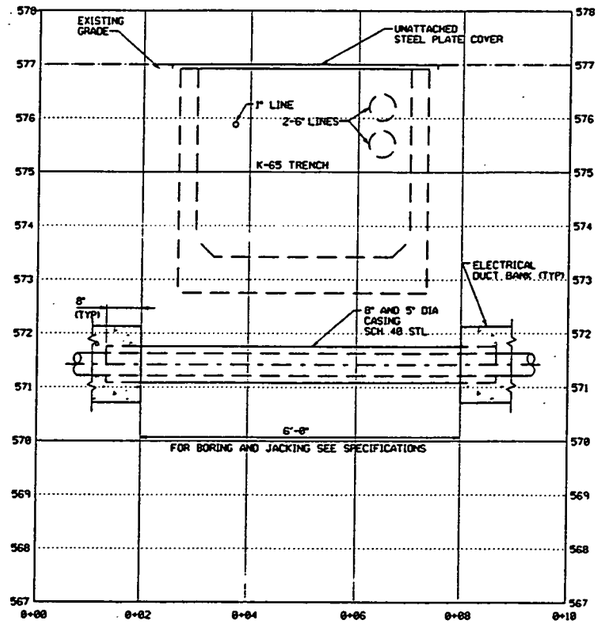
R94g00910.m(7311.ws104) po146@ws104. Fri Aug 25 15:17:28 CDT 1995



SN - 4" SANITARY SEWER PROFILE

SCALE: HOR 1"=50'
VER 1"=5'

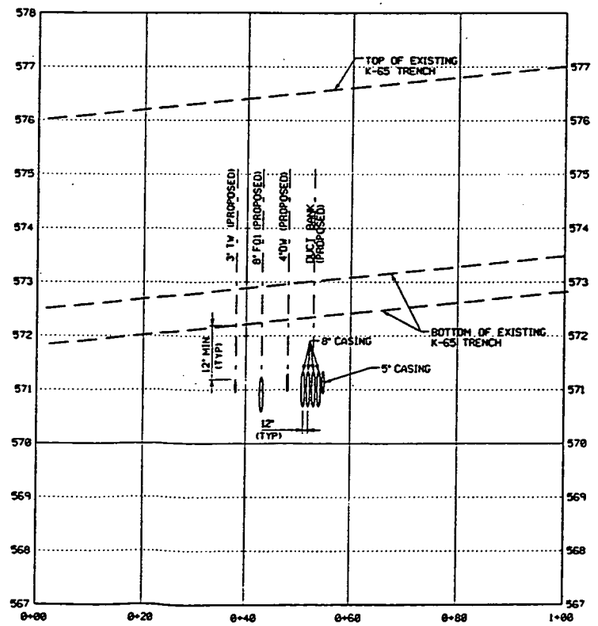
REF G00898 G00911



SECTION A

SCALE: HOR 1"=2'
VER 1"=1'

REF G00910 G00898



SECTION B

SCALE: HOR 1"=10'
VER 1"=1'

REF G00910 G00898

NOTES

1. EXISTING FENCE TO BE REINSTALLED AT THE COMPLETION OF SANITARY LINE CONSTRUCTION.

134

000108

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00898	UTILITY PLAN
94X-5900-G-00911	SANITARY SEWER DETAILS

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	FERNCO	DATE
		INITIALS AND DATE		
A	ISSUED FOR 90% DESIGN REVIEW		N/A	

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

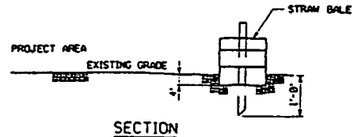
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
SANITARY SEWER AND UTILITY PROFILES

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
G. BABAYAN	6/30/95			Y. AFSHAR	8/15/95
PLANT/BLDG NO.		FLOOR		SCALE	CLASS
				AS SHOWN	
SUBMITTED FOR APPROVAL		FERNCO QAU APPROVAL		N/A	
A-E	DATE		DATE		

PREPARED UNDER PURCHASE/PROJECT ORDER NUMBER	DOE PROJECT NO.	FCDP PROJECT NO.	DRAWING FILE CODE NO.	SHEET NO.	REV. NO.
CRU4/P0146		WBS 1.1.1.4.3 00-90701	94X-5900-G-00910	G0006	A

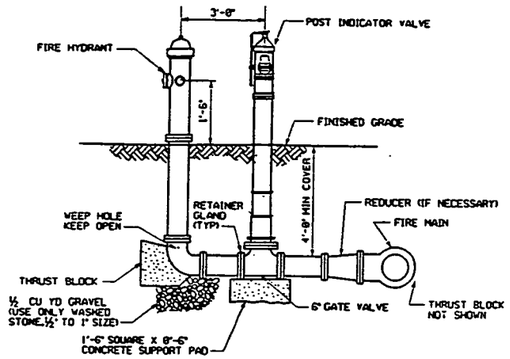
R94g00902.m(7313.ws104) po146@ws104. Fri Aug 25 15:30:26 CDT 1995



SECTION

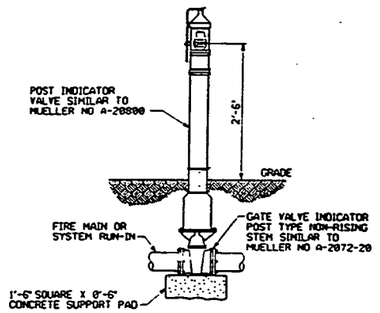
NOTES:
1. STRAW BALES TO BE USED WHEN NATURAL GROUND IS LEVEL OR SLOPING AWAY FROM PROJECT.
2. PLACE STRAW BALES APPROXIMATELY PARALLEL TO BOTTOM OF FILL SLOPE.
3. STAKES SHALL BE PER SPECIFICATION 02270.
4. STRAW BALES SHALL BE STANDARD SIZE 18" x 18" x 48".
5. FOR EROSION CONTROL MAINTENANCE SEE SPECIFICATIONS.

DETAIL (1) REF C00902 C00986
STRAW BALE EROSION CONTROL
NTS

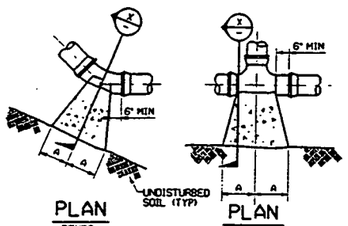


NOTE: FLANGE ADAPTOR'S AND DI SPOOL PIPE SHALL BE USED AT ALL TRANSITIONS OF UNLIKE PIPING MATERIAL.

DETAIL (2) REF C00902 C00898
FIRE HYDRANT WITH CONTROL VALVE
NTS



DETAIL (3) REF C00902 C00898
POST INDICATOR VALVE
NTS



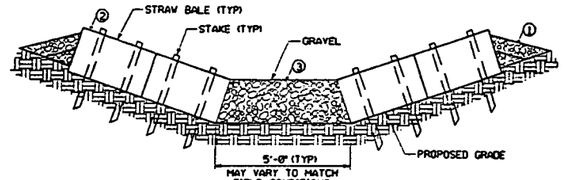
SECTION (X)
BENDS & TEES

TYPE	SIZE	⅛ BENDS A	⅛ BENDS B	¼ BENDS A	¼ BENDS B	⅛ BENDS A	⅛ BENDS B	TEES A	TEES B	PLUGS C	PLUGS D
2000 PSF SOIL	6"	16"	10"	9"	10"	6"	8"	10"	12"	10"	21"
	8"	22"	13"	12"	13"	8"	10"	13"	16"	12"	29"
	10"	26"	17"	14"	17"	10"	13"	16"	20"	14"	36"
	12"	29"	21"	16"	21"	11"	16"	18"	24"	16"	41"

NOTE: BASED ON 100 PSI STATIC PRESSURE PLUS A.W.W.A. WATER HAMMER. ALL BEARING SURFACES TO BE CARRIED TO UNDISTURBED GROUND.

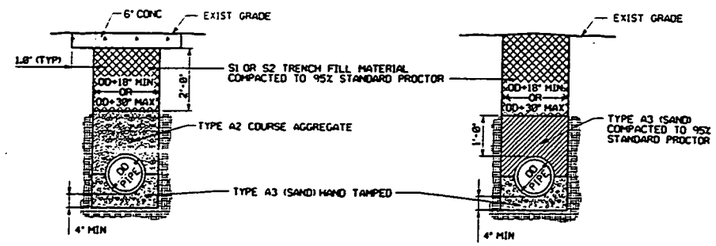
NOTES:
1. ALL FIRE PROTECTION WORK, MATERIALS, AND LABOR SHALL MEET THE REQUIREMENTS OF NFPA 24.
2. ALL FIRE PROTECTION PIPING SHALL HAVE A MINIMUM COVER OF 4'-0".
3. IF PIPE DIAMETER IS LESS THAN 6", USE 6" DESIGN CRITERIA.
4. DETAIL APPLIES TO DUCTILE IRON AND HDPE PIPE.

DETAIL (4) REF C00902 C00924
THRUST BLOCKS
NTS



① ODOT ITEM 384 STABILIZED CRUSHED AGGREGATE (2-6" COURSES) ON FILTER FABRIC, ODOT ITEM 712, TYPE D.
② INSTALL STRAW BALE AS SHOWN IN DETAIL 1.
③ GRAVEL TO BE ODOT ITEM 601.07, TYPE C TOP WIDTH TO BE SAME AS STRAW BALES.

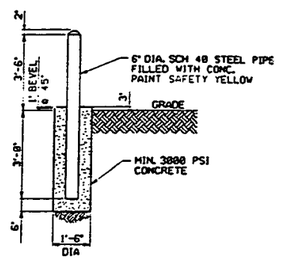
DETAIL (5) REF C00902 C00986
CHECK DAM
NTS



BEDDING UNDER PAVEMENT

NOTE:
SEE SPECIFICATIONS SECTION 02200 EARTHWORK

TYPICAL PIPE BEDDING DETAIL
NTS



TYPICAL EXTERIOR GUARD POST DETAIL
NTS

NOTES

1. UNLESS OTHERWISE NOTED ALL MATERIALS SHALL CONFORM TO THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION (ODOT) CONSTRUCTION AND MATERIAL SPECIFICATIONS DATED JANUARY 1, 1995.
2. UNLESS OTHERWISE NOTED, ALL CONCRETE SHALL BE ODOT CLASS F, 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS, AS PER ODOT ITEM 499 SPECIFICATION.

134

000189

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00898	UTILITY PLAN
94X-5900-G-00986	GRADING AND DRAINAGE PLAN
94X-5900-G-00924	WATERLINE DETAILS

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E	FERNALD CRU APPROVAL	DATE
				DETAILS AND DATE
A	ISSUED FOR 90% DESIGN REVIEW		N/A	

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

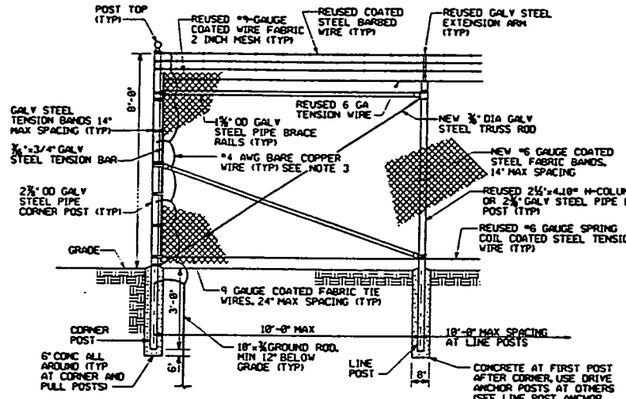
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL DETAILS SHEET 1 OF 2

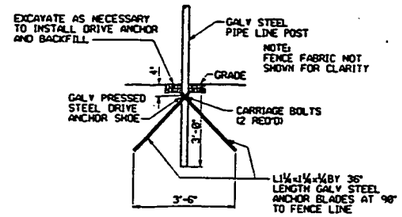
DRAWN BY	DATE	LEAD ENGINEER	DATE	ENGINEER OF RECORD	DATE
D. THOMPSON	6/16/95			K. GERARD	8/15/95
PLOT/ALLOC NO.		FLOOR		SCALE	CLASS
				NONE	
SUBMITTED FOR APPROVAL		FERNALD CRU APPROVAL			
		N/A		N/A	
A/E	DATE		DATE		
CAC PROJECT NO.	FERNALD PROJECT NO.	DRAWING BOOK CODE NO.		SHEET NO.	REV. NO.
	WBS 1.1.1.4.3 00-90701	94X-5900-G-00902		G0007	A

PREPARED UNDER FERNALD PROJECT DESIGN NUMBER
CRU4/P0146

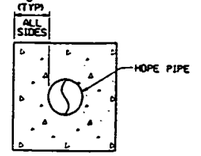
R94g00909.m(7315.ws104) po146@ws104. Fri Aug 25 15:33:48 CDT 1995



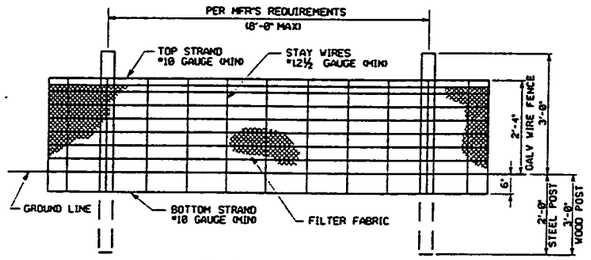
DETAIL ① REF C00949 C00899
NTS



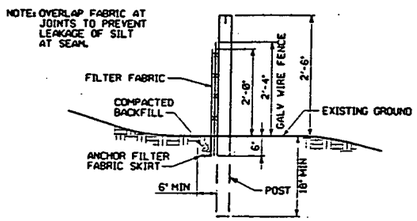
LINE POST DRIVE ANCHOR DETAIL
NTS



DETAIL ② REF C00949 C00899 C00900 C00906 C00910
CONCRETE ENCASEMENT
NTS



ELEVATION



SECTION

NOTES FOR SILT FENCE

1. FENCE CAN BE FIELD CONSTRUCTED AND INSTALLED OR A PREMANUFACTURED FENCE MAY BE USED.
2. PREMANUFACTURED FENCE SHALL BE MIRAFI, INC. ENVIROFENCE OR EQUAL.
3. FOR FIELD CONSTRUCTED FENCE:

   WIRE SHALL BE A MINIMUM OF 32 INCHES IN WIDTH AND SHALL HAVE A MINIMUM OF 6 LINE WIRES WITH 12 INCH STAY SPACING.

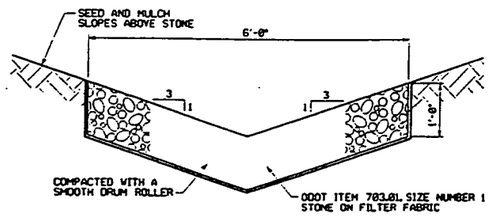
   FILTER FABRIC SHALL BE EITHER TREVIRA 1125, AMOCO CONSTRUCTION FABRIC SILT STOPPER, OR EQUAL.

   FILTER FABRIC SHALL BE A MINIMUM OF 36 INCHES WIDE AND SHALL BE FASTENED ADEQUATELY TO THE WIRE AT 8' ON CENTER.

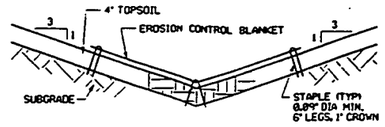
   STEEL POSTS SHALL BE 5'-0" IN HEIGHT AND BE OF THE SELF-FASTENER ANGLE STEEL TYPE.

   WOOD POSTS SHALL BE A MINIMUM OF 6'-0" IN HEIGHT AND 3" OR MORE IN DIAMETER. WIRE FABRIC SHALL BE FASTENED TO POST WITH NOT LESS THAN #9 WIRE STAPLES, 1½" LONG.

DETAIL ③ REF C00949 C00906
TEMPORARY SILT FENCE
NTS



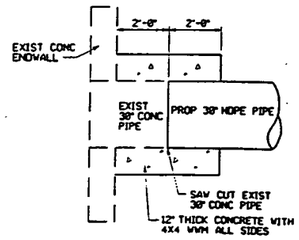
DETAIL ④ REF C00949 C00906
STONE LINED DITCH
NTS



NOTES:

1. FERTILIZE AND SEED PRIOR TO APPLYING EROSION CONTROL BLANKET AND MULCH.
2. INSTALL 4' WIDE EROSION CONTROL BLANKET SIMILAR TO CURLEX-II AT CHANNEL BOTTOM. STAPLE AT FLOWLINE AND TOP AT 4' INTERVALS. MULCH AREA ABOVE BLANKET.

DETAIL ⑤ REF C00949 C00906
DRAINAGE DITCH
NTS



DETAIL ⑥ REF C00949 C00906
ENDWALL CONNECTION
NTS

NOTES

1. UNLESS OTHERWISE NOTED ALL MATERIALS SHALL CONFORM TO THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION (ODOT) CONSTRUCTION AND MATERIAL SPECIFICATIONS DATED JANUARY 1, 1995.
2. UNLESS OTHERWISE NOTED, ALL CONCRETE SHALL BE ODOT CLASS F, 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

134

000110

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00900	WATERLINE PROFILES
94X-5900-G-00906	GRADING AND DRAINAGE PLAN
94X-5900-G-00910	SANITARY SEWER AND UTILITY PROFILES
94X-5900-G-00899	SITE PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS	DATE
A	ISSUED FOR 90% DESIGN REVIEW	N/A	

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

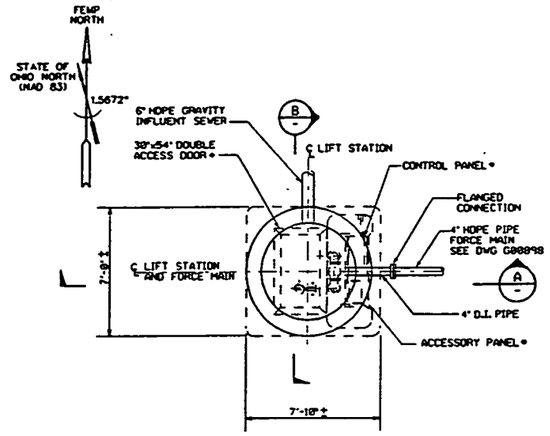
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
DETAILS
SHEET 2 OF 2

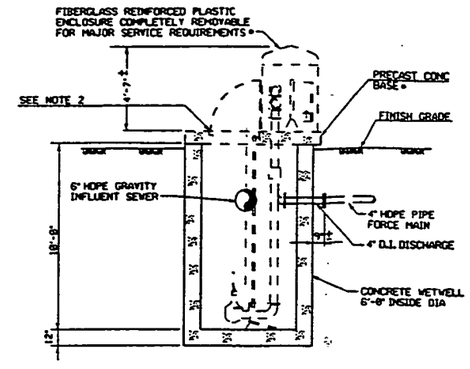
DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
D.THOMPSON	05-16-95			K. GERARD	8/15/95
PCRT/ASLC NO.		FLOOR		SCALE: NONE	CLASS
SUBMITTED FOR APPROVAL		FERNCO QAU APPROVAL: N/A		N/A	

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	CDC PROJECT NO.	FCDP PROJECT NO.	DRAWING PARTY CODE NO.	SHEET NO.	REV. NO.
CRU4/P0146		WBS 1.1.1.4.3 00-90701	94X-5900-G-00909	G0008	A

R94g00911.m(7336.ws104) po146@ws104. Mon Aug 28 06:34:26 CDT 1995



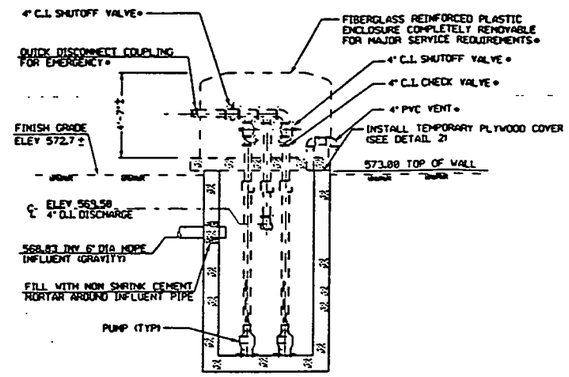
TOP VIEW



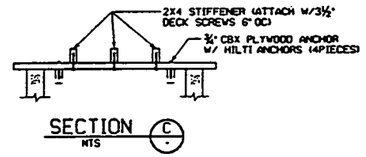
SECTION A NTS

NOTE:
* INDICATES FUTURE WORK BY OTHERS

LIFT STATION DETAIL 1 NTS REF G88911 G88898



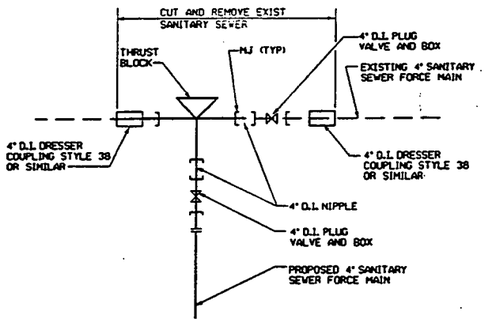
SECTION B NTS



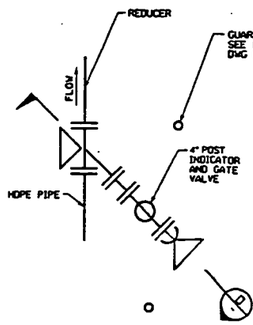
SECTION C NTS

TOP VIEW

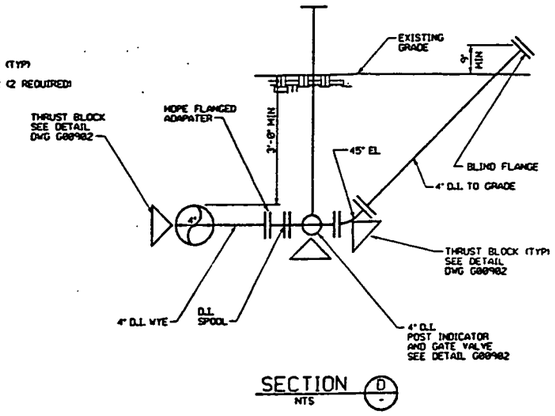
TEMPORARY PLYWOOD COVER DETAIL 2 NTS



DETAIL 3 NTS REF G88911 G88898



PLAN



SECTION D NTS

CLEANOUT DETAIL 4 NTS REF G88911 G88898

NOTES

1. DASHED LINED ITEM ON LIFT STATION DETAILS INDICATES FUTURE WORKS BY OTHERS.
2. CONTRACTOR SHALL PROVIDE AND INSTALL A TEMPORARY PLYWOOD COVER ON THE LIFT STATION PER DETAIL 2 THIS DRAWING.

134

000111

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	INDEX SHEET
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00898	UTILITY PLAN (MASTER PLAN)
94X-5900-G-00982	DETAILS - SHEET 1 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

A	ISSUED FOR 90% DESIGN REVIEW		B/A	
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS	POWER	DATE

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

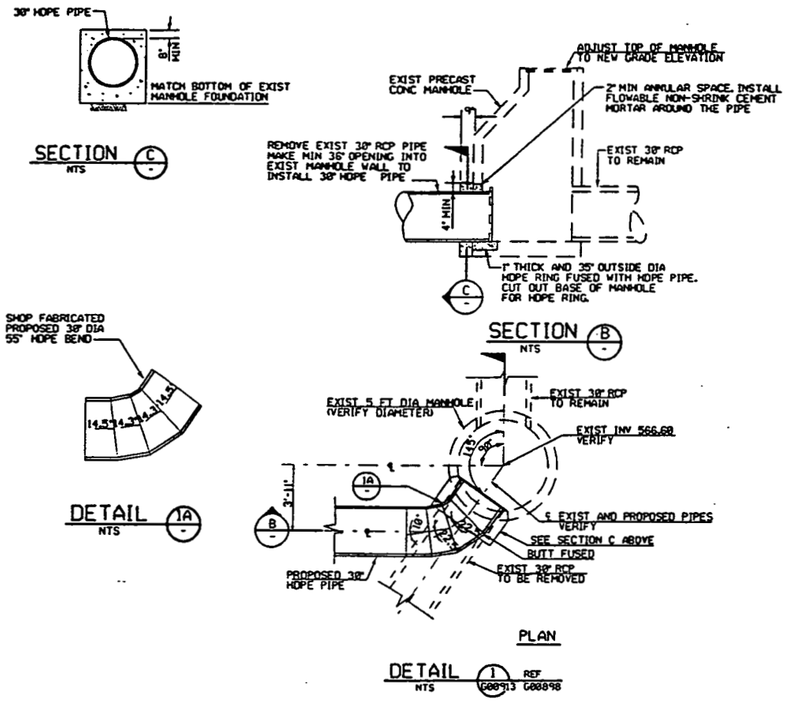
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

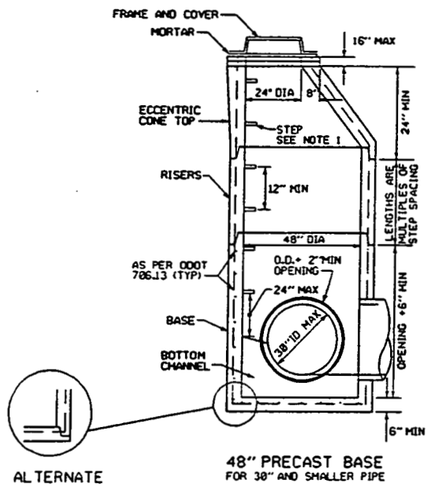
DRAWING TITLE
CIVIL
SANITARY SEWER DETAILS

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
O. BABAYAN	8/18/95			Y. AFSHAR	8/15/95
PLANT/AREA NO.		FLOOR		SCALE: NONE	CLASS
SUBMITTED FOR APPROVAL:		TECHNICAL APPROVAL: N/A		N/A	
DOE PROJECT NO.	DATE	TOP PROJECT NO. WBS 1.1.1.4.3 00-90701	DRAWING REFERENCE NO. 94X-5900-G-00911	SHEET NO. G0009	REV. NO. A

PREPARED UNDER PARSONS PROJECT ORDER NUMBER: CRU4/P0146

R94g00913.m(7319.ws104) po146@ws104. Fri Aug 25 15:58:53 CDT 1995



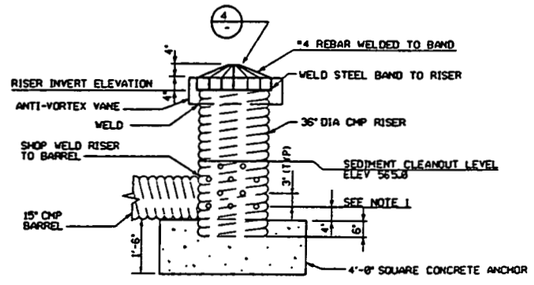


NOTES

1. UNLESS OTHERWISE NOTED ALL MATERIALS SHALL CONFORM TO THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS DATED JANUARY 1, 1995.
2. UNLESS OTHERWISE NOTED, ALL CONCRETE SHALL BE ODOT CLASS F, 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

134

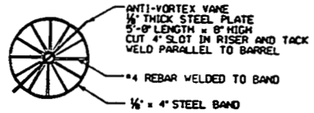
000112



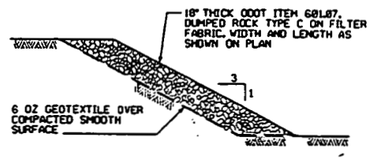
NOTES:

1. 4 ROWS OF 1" DIA HOLES AT 3" O.C., 16 HOLES PER ROW.
2. DURING CONSTRUCTION, SEDIMENT TO BE REMOVED FROM BASIN WHEN SEDIMENT ELEVATION REACHES THE SEDIMENT CLEANOUT ELEVATION. AT THE CONCLUSION OF THE PROJECT, ALL ACCUMULATED SEDIMENT SHALL BE REMOVED AND ALL GRADES RESTORED TO THE DESIGN ELEVATIONS.
3. AGGREGATE AND DUMPED ROCK NOT SHOWN, SEE SECTION A.
4. ALL CUTS AND WELDS TO BE PAINTED WITH A GALVANIZED COATING COMPOUND.

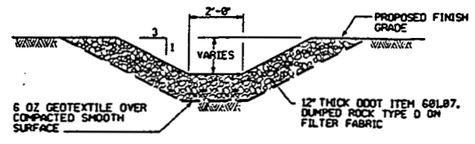
DETAIL 3 REF G00913 G00898 G00906
RISER NTS



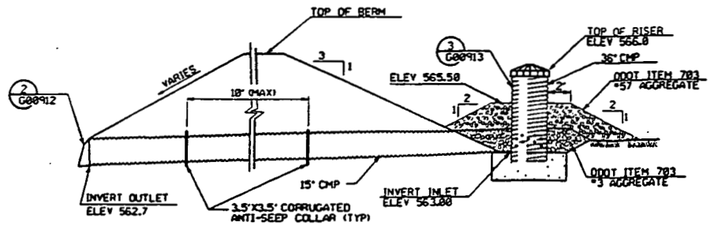
DETAIL 4 NTS



DETAIL 5 NTS REF G00913 G00906



CHANNEL SECTION DETAIL 6 REF G00913 G00906
NTS



NOTES:

1. ANTI-SEEP COLLAR TO CONNECT TO PIPE WITH WATERTIGHT JOINT.
2. ANTI-SEEP COLLAR TO BE SAME GAUGE AS PIPE MATERIAL.

SECTION A NTS REF G00913 G00906

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00898	UTILITY PLAN
94X-5900-G-00906	GRADING AND DRAINAGE PLAN
94X-5900-G-00908	STORM DRAIN PROFILES
94X-5900-G-00912	STORMWATER MANAGEMENT DETAILS - SHEET 2 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-C	ORIGINATOR	DATE
A	ISSUED FOR 90% DESIGN REVIEW		N/A	

INITIALS AND DATE

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

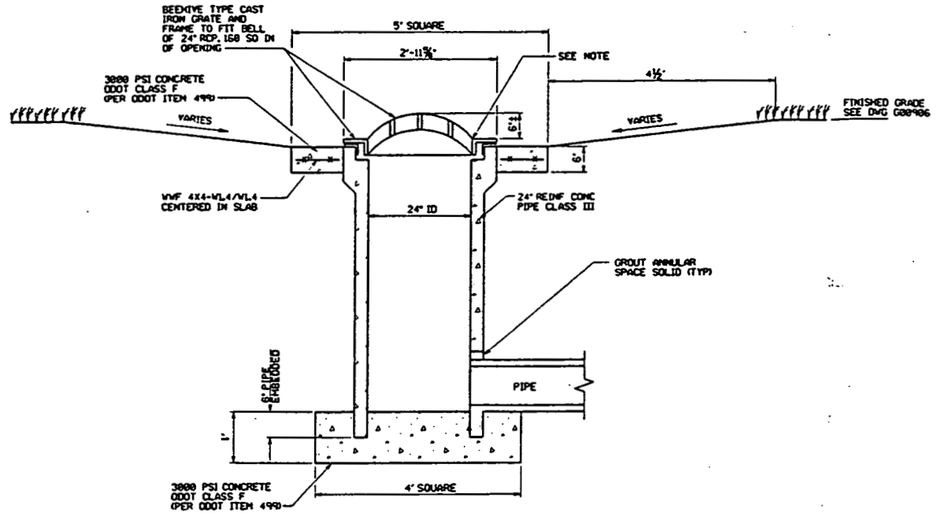
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
STORMWATER MANAGEMENT DETAILS
SHEET 1 OF 2

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
O. BABAYAN	7/14/95			K. GERARD	8/15/95
PLANT/BLDG NO.		FLOOR		SCALE	D.W.G.
				NONE	
SUBMITTED FOR APPROVAL		FERNCO QRU APPROVAL			
		N/A		N/A	

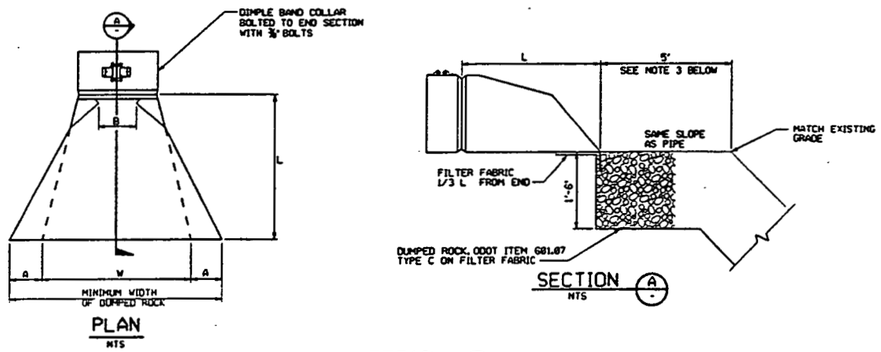
PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DOE PROJECT NO.	DATE	FEMP PROJECT NO.	DRAWING REPO CODE NO.	SHEET NO.	REV. NO.
CRU4/PO146			VBS LJ.1.4.3 00-90701	94X-5900-G-00913	G0010	A

R94g00912.m(7321.ws104) po146@ws104. Fri Aug 25 16:14:03 CDT 1995



NOTE:
REFER TO PIPE PROFILES FOR INVERT AND TOP OF GRATE ELEVATIONS.

DETAIL (1) REF G00912 G00906
CATCH BASIN INLET
NTS



PLAN
NTS

SECTION (A)
NTS

DETAIL (2) REF G00912 G00906
STANDARD FLARED END SECTION
NTS

1. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
2. MATERIAL TO BE GALVANIZED STEEL.
3. LENGTH OF DUMPED ROCK IS 5' UNLESS NOTED OTHERWISE ON SITE/GRADING/UTILITY PLAN
4. DIMENSIONS, IN INCHES, ARE AS FOLLOWS:

15" DIA	18" DIA
A=7.5 (1'±)	A=8 (1'±)
L=26 (1.5'±)	L=31 (1.5'±)
W=38 (2'±)	W=36 (2'±)
B=8 MAX	B= 8 MAX

NOTES

1. UNLESS OTHERWISE NOTED ALL MATERIALS SHALL CONFORM TO THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION (ODOT) CONSTRUCTION AND MATERIAL SPECIFICATIONS DATED JANUARY 1, 1995.
2. UNLESS OTHERWISE NOTED, ALL CONCRETE SHALL BE ODOT CLASS F, 3000 PSI COMPRESSIVE STRENGTH AT 28 DAYS.

134

060113

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00906	GRADING AND DRAINAGE PLAN

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E	FERNCO	DATE
A	ISSUED FOR 90% DESIGN REVIEW	N/A		

DETAILS AND DATE

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

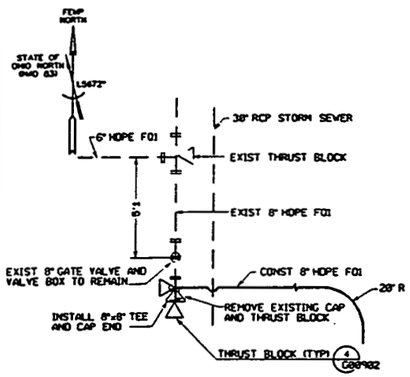
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
STORMWATER MANAGEMENT DETAILS
SHEET 2 OF 2

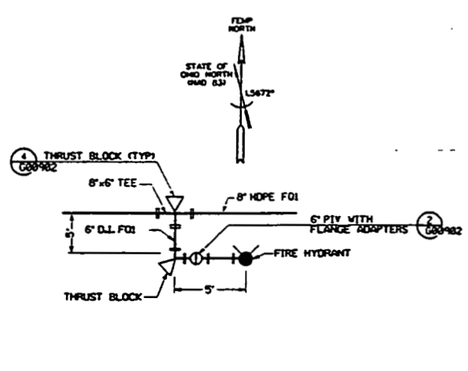
DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
D.THOMPSON	08-16-95			R. GERARD	08-15-95
PROPERTY NO.		FLOOR		SCALE: NONE	CLASS
SUBMITTED FOR APPROVAL		FERNCO QA APPROVAL: N/A		N/A	
A/E	DATE		DATE		

PREPARED UNDER PURCHASE PROJECT ORDER NUMBER	DOE PROJECT NO.	TEMP PROJECT NO.	DRAWING BLOCK CODE NO.	SHEET NO.	REV. NO.
CRU4/PO146		WBS 1.1.1.4.3 00-90701	94X-5900-G-00912	G0011	A

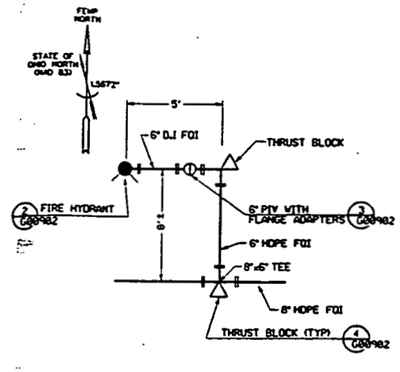
R94g00924.m(7323.ws104) po146@ws104. Fri Aug 25 16:16:04 CDT 1995



DETAIL 1 NTS REF C00924 C00898



DETAIL 2 NTS REF C00924 C00898



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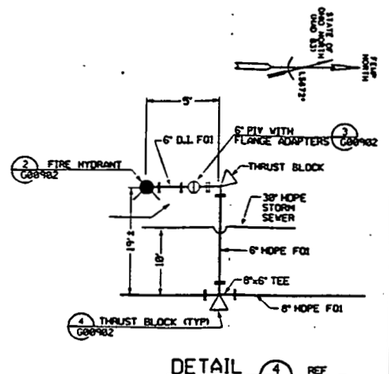
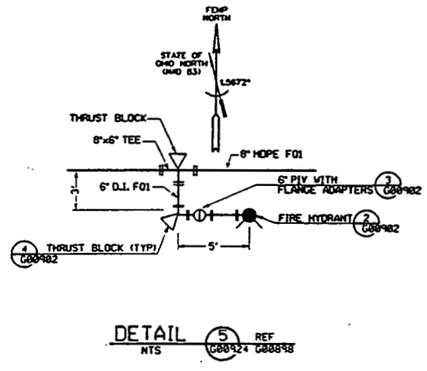


DETAIL 4 NTS REF C00924 C00898



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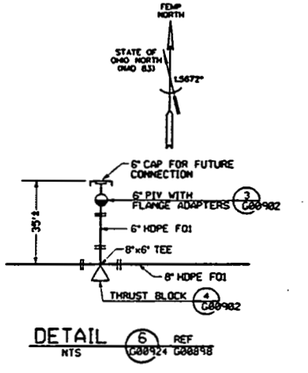
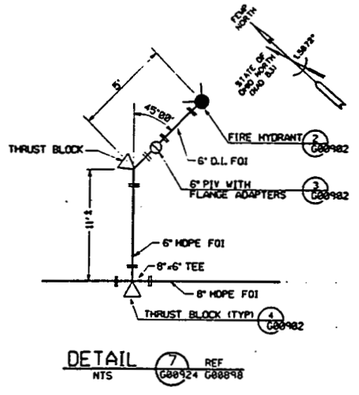


DETAIL 6 NTS REF C00924 C00898



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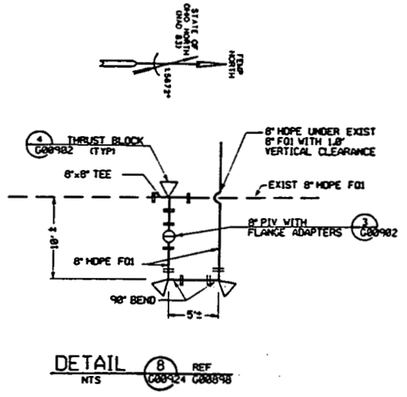
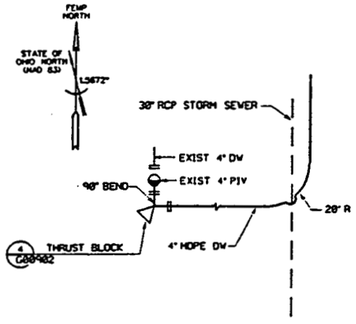
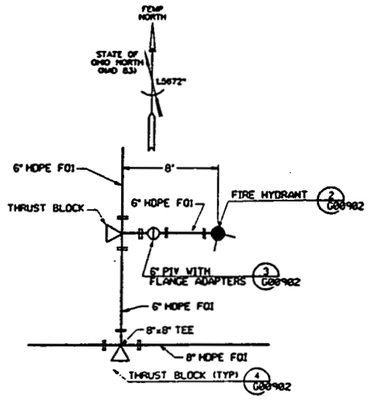


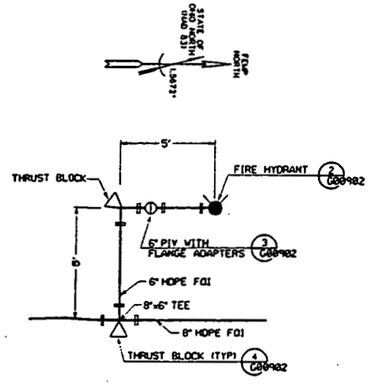
DETAIL 8 NTS REF C00924 C00898



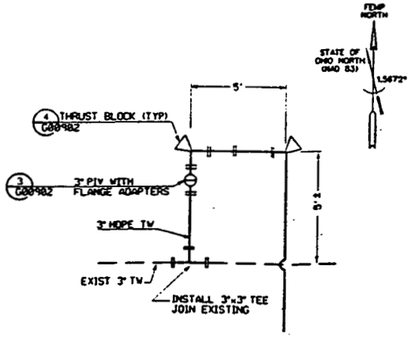
DETAIL 9 NTS REF C00924 C00898



DETAIL 10 NTS REF C00924 C00898



DETAIL 11 NTS REF C00924 C00898



DETAIL 12 NTS REF C00924 C00898

NOTES

134

009114

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	INDEX SHEET
94X-5900-X-00927	LEGEND AND SYMBOLS
94X-5900-G-00898	UTILITY PLAN (MASTER PLAN)
94X-5900-G-00982	CIVIL - DETAILS - SHEET 1 OF 2

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E	FERNCO	DATE
		INITIALS AND DATE		
A	ISSUED FOR 90% DESIGN REVIEW	N/C		

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

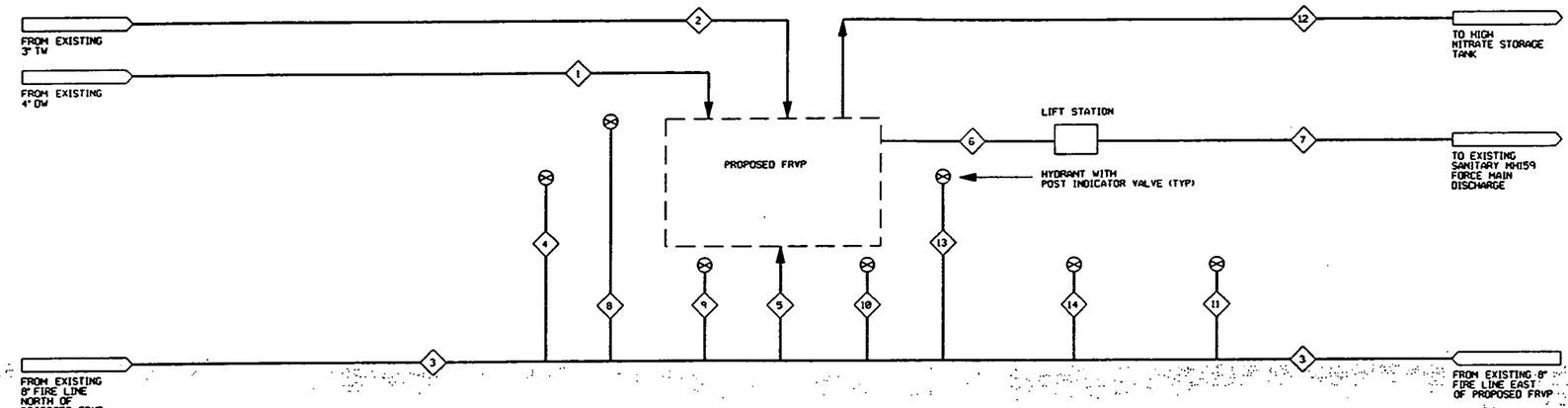
PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
CIVIL
WATER LINE DETAILS

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
O. BABAYAN	07-11-95			T. AFSHAR	8-15-95
PLOT/ELEC. NO.		FLOOR		SCALE: NONE	CLASS
SUBMITTED FOR APPROVAL A/E DATE		FERNCO CRU APPROVAL DATE	N/A	N/A	

PREPARED UNDER PURCHASE/PROJECT ORDER NUMBER	DOE PROJECT NO.	TEMP PROJECT NO.	DRAWING BASIC CODE NO.	SHEET NO.	REV. NO.
CRU4/P0146		VBS 1.1.1.1.4.3 00-90701	94X-5900-G-00924	G0012	A

R94f00919.m(415.ws315) po146@ws315. Tue Sep 5 10:41:11 CDT 1995



STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
COMPONENT	DOMESTIC WATER	PROCESS WATER	FIRE PROTECT. (TOTAL)	HYDRANT FLOW	FIRE PROTECT. TO FRVP	SANITARY GRAVITY FLOW	SANITARY FORCE MAIN	HYDRANT FLOW	HYDRANT FLOW	HYDRANT FLOW	HYDRANT FLOW	PROCESS WASTE WATER	HYDRANT FLOW	HYDRANT FLOW
OPERATING HR/DAY	24	24	INTERMIT	INTERMIT	INTERMIT	INTERMIT	INTERMIT	INTERMIT	INTERMIT	INTERMIT	INTERMIT	24	INTERMIT	INTERMIT
SOLIDS (LBS/HR)														
WATER (LBS/HR)														
AIR (GAS) (LBS/HR)														
ADDITIVES (LBS/HR)														
TOTAL (LBS/HR)														
SPECIFIC GRAVITY - DRY SOLIDS														
SPECIFIC GRAVITY - SLURRIES														
RADON (uCi/L)														
SOLIDS FLOW (CFM)														
LIQUID FLOW (GPM)	55	150		1000		55	55	1000	1000	1000	1000	150	1000	1000
GAS FLOW (SCFM)														
TEMPERATURE (DEG F)														
PRESSURE (PSIG)	60	60		20 (MIN)				20 (MIN)	20 (MIN)	20(MIN)	20 (MIN)		20 (MIN)	20 (MIN)
NOTES	1	1	1		1	1	1							

NOTES

1. FLOWS SHALL BE DETERMINED WHEN THE THROUGHPUT OF THE PROPOSED FRVP IS KNOWN.

134

000115

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	FERNCO	DATE
			DETAILS AND DATE	
B	ISSUED FOR 90% TITLE II REVIEW		N/A	
A	ISSUED FOR 30% TITLE I REVIEW		N/A	

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION FOR UNDERGROUND UTILITIES
FERNALD SILOS DEMONSTRATION PLANT

DRAWING TITLE
MECHANICAL PROCESS UTILITY FLOW DIAGRAM UNDERGROUND UTILITIES

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
P. A. WILSON	6/22/95			D. CARLSON	6/28/95
PLANT/BLDG NO.		FLOOR		SCALE: NONE	CLASS
SUBMITTED FOR APPROVAL		FERNCO CRU APPROVAL: N/A		CERTIFIED FOR CONSTRUCTION: N/A	
A-E	DATE		DATE	CRU DIRECTOR	DATE

DOE PROJECT NO.	TEMP PROJECT NO.	DRAWING NUMBER CODE NO.	SHEET NO.	REV. NO.
	WBS 1.1.1.4.3.2 00-90701	94X-5900-F-00919	F0001	B

PREPARED UNDER PARSONS PROJECT ORDER NUMBER: CRUA/AP0385

94n00921.m(416.ws315) po146@ws315. Tue Sep 5 10:45:51 CDT 1995

PIPING SYMBOLS

- GATE VALVE
- GLOBE VALVE
- BALL VALVE
- PLUG VALVE
- BUTTERFLY VALVE/DAMPER
- STOP CHECK
- NEEDLE VALVE
- CHECK VALVE
- SLIDING GATE VALVE
- BALL CHECK VALVE
- BACKFLOW PREVENTER
- DIAPHRAGM VALVE
- PINCH VALVE
- 3 WAY VALVE
- 3 WAY BALL VALVE
- 3 WAY PLUG VALVE
- ANGLE GATE VALVE
- ANGLE GLOBE VALVE
- FOOT VALVE
- MOTOR OPERATOR
- DIAPHRAGM OPERATOR
- DIAPHRAGM W/ POSITIONER
- PISTON OPERATOR
- SAFETY RELIEF VALVE
- SOLENOID OPERATOR
- SELF-CONTAINED BACK PRESSURE REGULATING VALVE
- 2-WAY SOLENOID VALVE
- 3-WAY SOLENOID VALVE (INDICATES DEENERGIZED POSITION)
- 4-WAY SOLENOID VALVE
- VALVE WITH OPERATOR (VALVE TYPE UNDEFINED)
- FIRE HYDRANT
- STEAM TRAP
- HOSE QUICK COUPLING
- UNION
- DRAIN LEG
- EXPANSION JOINT
- HANDWHEEL
- EJECTOR
- STRAINER (Y TYPE)
- STRAINER (SINGLE BASKET)
- STRAINER (DOUBLE BASKET)
- STRAINER (CONE TYPE)
- STRAINER (SUCTION TYPE)
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- ORIFICE
- VENTURI TUBE
- SIPHON TUBE
- HUB DRAIN OR FUNNEL
- THERMOWELL
- FLOW DIRECTION
- WELDED CONNECTION
- FLANGED CONNECTION
- FLEXIBLE HOSE
- PIPE CAP
- TIE/IN MARK
- PRIMARY (UNDERGROUND)
- SECONDARY
- EXISTING PIPING OR EQUIPMENT
- FUTURE PIPING OR EQUIPMENT
- PERFORMANCE GRADE EQUIPMENT OR PIPING
- PACKAGED SYSTEM
- PULSATION DAMPENER
- AIR FILTER
- FILTER LUBRICATOR REGULATOR
- AIR OPERATED DIAPHRAGM PUMP
- HORIZONTAL CENTRIFUGAL PUMP
- VERTICAL CENTRIFUGAL PUMP
- SUBMERSIBLE SUMP PUMP
- CHEMICAL METERING PUMP
- ROTARY SCREW AIR COMPRESSOR
- GEAR PUMP
- FLOW NOZZLE
- SELF - CONTAINED FLOW REGULATED VALVE
- AGITATOR (MIXER)

ABBREVIATIONS

AO	AIR TO OPEN
AC	AIR TO CLOSE
BTU	BRITISH THERMAL UNIT
CU FT	CUBIC FEET
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
KW	KILOWATT
LB/HR	POUNDS PER HOUR
SCFM	STD. CUBIC FT/MINUTE
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
FO	FAIL OPEN
FC	FAIL CLOSED
IA	INSTRUMENT AIR
EF	EXHAUST FAN
GV	GRAVITY VENTILATOR
UH	UNIT HEATER
RED	REDUCER
ECC	ECCENTRIC
TBD	TO BE DETERMINED
TF	TOP FLAT
TYP	TYPICAL
MATL	MATERIAL
MED	MEDIUM
CO	CARBON MONOXIDE
RH	RELATIVE HUMIDITY
I	INSULATION ONLY
P	PERSONNEL PROTECTION
CFM	CUBIC FEET/MINUTE
PG	PERFORMANCE GRADE
LH	LOW HAZARD
MH	MANHOLE
HH	HIGH HAZARD
HC	HAZARD CLASSIFICATION
SIH	STANDARD INDUSTRIAL HAZARD
SSC	STRUCTURES, SYSTEMS OR COMPONENTS
PIV	POST INDICATOR VALVE
FRVP	FERNALD RESIDUES VITRIFICATION PLANT

INSTRUMENTATION SPECIAL DESIGNATIONS

DESIGNATION	FUNCTION/ABBREVIATION
$/N OR AVG	AVERAGING
± OR BI	BIAS
b1.1:3.2:1 (TYP)	BOOST,GAIN OR ATTENUATE (INPUT:OUTPUT)
Δ OR DIF	DIFFERENTIAL
÷ OR DIV	DIVIDE
√ OR SQ.RT.	EXTRACT SQUARE ROOT
X OR MUL	MULTIPLY
N	RAISE TO POWER
REV	REVERSING
Σ OR SUM	SUMMING
L	LOW
LL	LOW LOW
H	HIGH
HH	HIGH HIGH
HL	HIGH LOW
∫	INTEGRATE (TIME INTEGRAL)
%	PROPORTIONAL
Y	UNDETERMINED COMPUTING RELAY
HOA	HAND-OFF-AUTO
SS	START-STOP
⊽	EXISTING INSTRUMENT TO BE RELOCATED
I/P	CURRENT TO PNEUMATIC TRANSDUCER
RUN	RUNNING
OA	OFF-AUTO
OCA	OPEN-CLOSE-AUTO
I/O	INPUT / OUTPUT
O	OPEN
C	CLOSE
*	INSTRUMENT PROVIDED WITH ASSOCIATED EQUIPMENT
R/L	RAISE / LOWER

PIPING SPECIFICATIONS

FLOWING MEDIUM	MED CODE	MATL CODE
BOILER FEEDWATER	BF	A4
BACK WASH	BW	T
BRINE	BR	T
CHLORINE	CL	B1
CONDENSATE	CN	A4
POTABLE WATER	DW	B4
CHEMICAL FEED	CF	T
COOLING WATER	WS, WR	A
DRAIN	DR	A4
THICKENER OVERFLOW	TO	A
NATURAL GAS	FG	A4
FIRE PROTECTION	FO1	B4,M
FLUSH WATER	FW	A
FORCE MAIN	FM	B4
INSTRUMENT AIR	IA	W
MELTER OFF-GAS	OG	T, A
METAL OXIDE	MO	A
NITROGEN	NG	A4
PERCHED GND WATER	PGW	B
PHOSPHORIC ACID	PAPH	T1
PLANT AIR	PA	W
POLISHED WATER	PW	A
TREATED WATER	TW	B4
PROCESS WASTEWATER	CE	B4
RAW WATER	RW	A
RECYCLE WATER	RC	A, A2
STEAM	LS	A4
SOFTENER WATER	TW	A4
SANITARY SEWER	SN	B4
SODIUM HYDROXIDE	NA	A
SODIUM SILICATE	SS	A
STORM WATER	ST	A
SULFURIC ACID	SB	T1
SUMP DISCHARGE	SU	A
VACUUM	V	A
VENT	VE	A4
WASTE WATER	WW	A

EXAMPLE: CE-2"-A-100-ET/PG

- MEDIUM CODE
- NOMINAL PIPE SIZE
- MATERIAL CODE
- LINE NUMBER
- HEAT TRACING AND INSULATION
- PERFORMANCE GRADE

A -CLASS 150, CARBON STEEL
A1 -CLASS 150, CARBON STEEL
A4 -CLASS 150, CARBON STEEL
B -CLASS 150, PVC
B1 -PVDF
B2 -PVDF, 100 PSI
B3 -CLASS 150, CPVC
B4 -HDPE
C -CLASS 150, COPPER TUBING
L -CLASS 150, FRP
M -CLASS 125, DUCTILE IRON
T -CLASS 150, 304L STAINLESS STEEL
T1 -CLASS 150, 316L STAINLESS STEEL
T2 -CLASS 300, 304L STAINLESS STEEL PIPE
T3 -CLASS 150, 304L STAINLESS STEEL PIPE
W -CLASS 150, GALVANIZED STEEL
ET -ELECTRIC TRACED AND INSULATED
ST -STEAM TRACED AND INSULATED

INSTRUMENT SYMBOLS

- ELECTRICAL BINARY SIGNAL
- PNEUMATIC BINARY SIGNAL
- ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)
- ELECTROMAGNETIC OR SONIC SIGNAL (NON-GUIDED)
- INSTRUMENT AIR SUPPLY
- ELECTRICAL SIGNAL
- DATA HIGHWAY
- CAPILLARY
- HYDRAULIC SIGNAL LINE
- PNEUMATIC OR VACUUM SIGNAL LINE
- INTERLOCK
- DIAPHRAGM SEAL
- ROTAMETER
- SIGHT GLASS
- LOCAL MOUNTED INSTRUMENT
- FRONT OF PANEL MOUNTED INSTRUMENT
- FRONT OF PANEL MOUNTED INSTRUMENT AUXILLIARY LOCATION
- REAR OF PANEL MOUNTED INSTRUMENT
- REAR OF PANEL MOUNTED INSTRUMENT AUXILLIARY LOCATION
- SHARED DISPLAY COMPUTER CONTROL NOT NORMALLY ACCESSIBLE TO OPERATOR
- SHARED CONTROL AUXILIARY LOCATION
- SHARED DISPLAY COMPUTER CONTROL AND OPERATOR INTERFACE
- AIR VENT FILTER
- MAGNETIC FLOW METER
- POSITIVE DISPLACEMENT FLOW METER
- EQUIPMENT NUMBER
- ELECTRO-PNEUMATIC SIGNAL CONVERTER
- SHIELDED WIRE CUT & TAPE SHIELD
- AVERAGING PITOT TUBE

TYPICAL CALLOUT

FV 102A
- LETTERS OF IDENTIFICATION
- SPECIAL DESIGNATION
- INSTRUMENT TAG NUMBER

LOOP SHEET WIRING LEGEND

——— DENOTES FIELD WIRING
— — DENOTES PANEL WIRING
ICN1 DENOTES INSTRUMENT COMMUNICATIONS NETWORK NO.1
ICN2 DENOTES INSTRUMENT COMMUNICATIONS NETWORK NO.2

LOOP SHEET CABLE IDENTIFICATION

XXXI — CABLE DESIGNATION

LETTERS OF INSTRUMENT IDENTIFICATION

LETTER	FIRST LETTER: MEASURED OR INITIATING VARIABLE	2ND LETTER: MODIFIER	3RD OR 4TH LETTER: READ OUT OR PASSIVE FUNCTION
A	ANALYSIS	ALARM	ALARM
B	BURNER FLAME	----	----
C	CAMERA	CONTROLLER	CONTROLLER
D	DENSITY	DIFFERENTIAL	----
E	VOLTAGE	ELEMENT	ELEMENT
F	FLOW RATE	RATIO (FRACTION)	----
G	----	VIEWING DEVICE	GLASS
H	HAND (MANUAL)	----	HIGH
I	CURRENT (ELECT)	INDICATE	INDICATE
J	POWER	SCAN	----
K	TIME	----	----
L	LEVEL	LIGHT	LOW
M	MOIST OR HUMIDITY	----	----
N	----	----	----
O	OBSERVATION	----	ORIFICE
P	PRESSURE OR VACUUM	----	POINT (TEST)
Q	QUANTITY OR EVENT	TOTALIZER	----
R	RADIATION	RECORDER	RECORDER
S	SPEED OR FREQUENCY	SAFETY/SWITCH	SWITCH
T	TEMPERATURE	TRANSMITTER	TRANSMITTER
U	USER'S GUIDE	----	MULTIFUNCTION
V	VIBRATION	VALVE	VALVE
W	WEIGHT OR FORCE	WELL	----
X	CONTROL	----	UNCLASSIFIED
Y	RELAY	RELAY	----
Z	POSITION	----	----

NOTES

5 - 134

000116

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE	
B	ISSUED FOR 90% TITLE II REVIEW		N/A
A	ISSUED FOR 30% TITLE I REVIEW		N/A

UNITED STATES
DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION/UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
MECHANICAL PROCESS
PIPING AND INSTRUMENTATION DIAGRAM
SYMBOLS AND LEGEND SHEET

DRAWN BY	DATE	LEAD DRAFTER	DATE	CHECKED BY	DATE
P. A. WILSON	6/22/95			D. CARLSON	6/26/95
PORTABLE NO.		FLOOR		SCALE	CLASS
SUBMITTED FOR APPROVAL		FERNCO CRU APPROVAL			
		N/A		N/A	
A/E	DATE	DATE			

PROJECT UNDER PARSONS PROJECT ORDER NUMBER	DOE PROJECT NO.	TSDF PROJECT NO.	DRAWING NUMBER CODE NO.	SHEET NO.	REV. NO.
CRU4/P0146		WBS 1.1.1.4.3.2 00-90701	94X-5900-N-00921	N0001	B

JIM LAWSON Jan. 2, 1992 13:50:14

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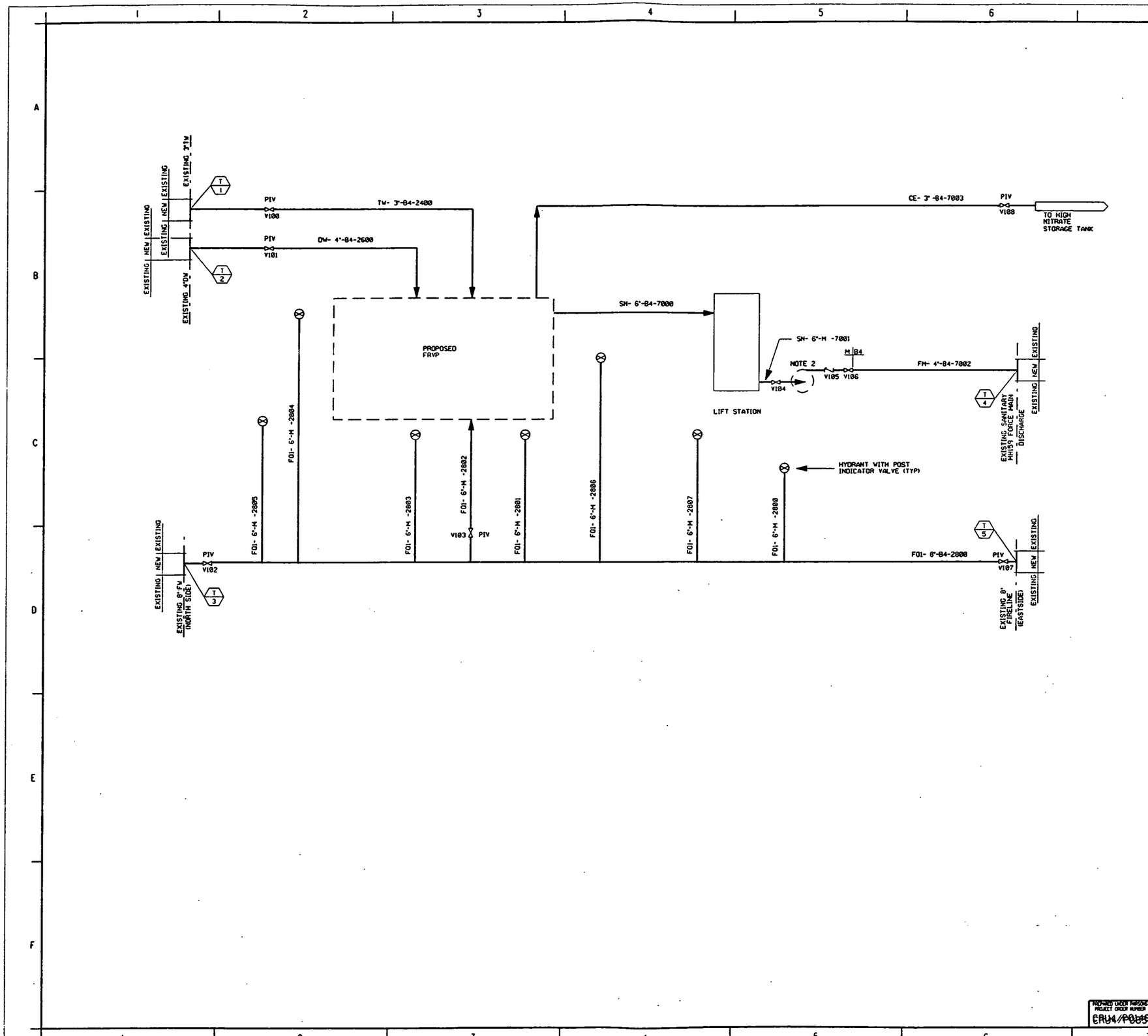

NOTES

1. LINE SIZES ARE PRELIMINARY.
2. PUMP AND PIPING TO BE INSTALLED IN FUTURE.
3. FOR PIPING DETAILS SEE CIVIL DRAWING 94x-5900-G-00924.

134

LAST VALVE NO.	V108

REFER DWG NO.	REFERENCE DWG TITLE
94x-5900-M-00921	P & ID SYMBOLS AND LEGEND SHEET
94x-5900-X-00926	DRAWING INDEX
94x-5900-G-00924	WATER LINE DETAILS

000117

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE: A-E	FERNCO	DATE
B	ISSUED FOR 90% TITLE II REVIEW		N/A	
A	ISSUED FOR 30% TITLE I REVIEW		N/A	

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION, UNDERGROUND UTILITIES
FERNALD RESIDUE WATER TREATMENT PLANT

DRAWING TITLE
MECHANICAL PROCESS
PIPING AND INSTRUMENTATION DIAGRAM
UNDERGROUND UTILITIES

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
P. A. WILSON	6/22/95			O. CARLSON	6/26/95

PLANT/BLDG NO.	FLOOR	SCALE	CLASS
		NONE	

SUBMITTED FOR APPROVAL	FERNCO QAV APPROVAL	
DATE	N/A	N/A

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DOE PROJECT NO.	TSDF PROJECT NO.	DRAWING BASIC CODE NO.	SHEET NO.	REV. NO.
ERU4/P0145		WBS 1.1.1.4.3.2 00-90701	94X-5900-N-00920	N0002	B

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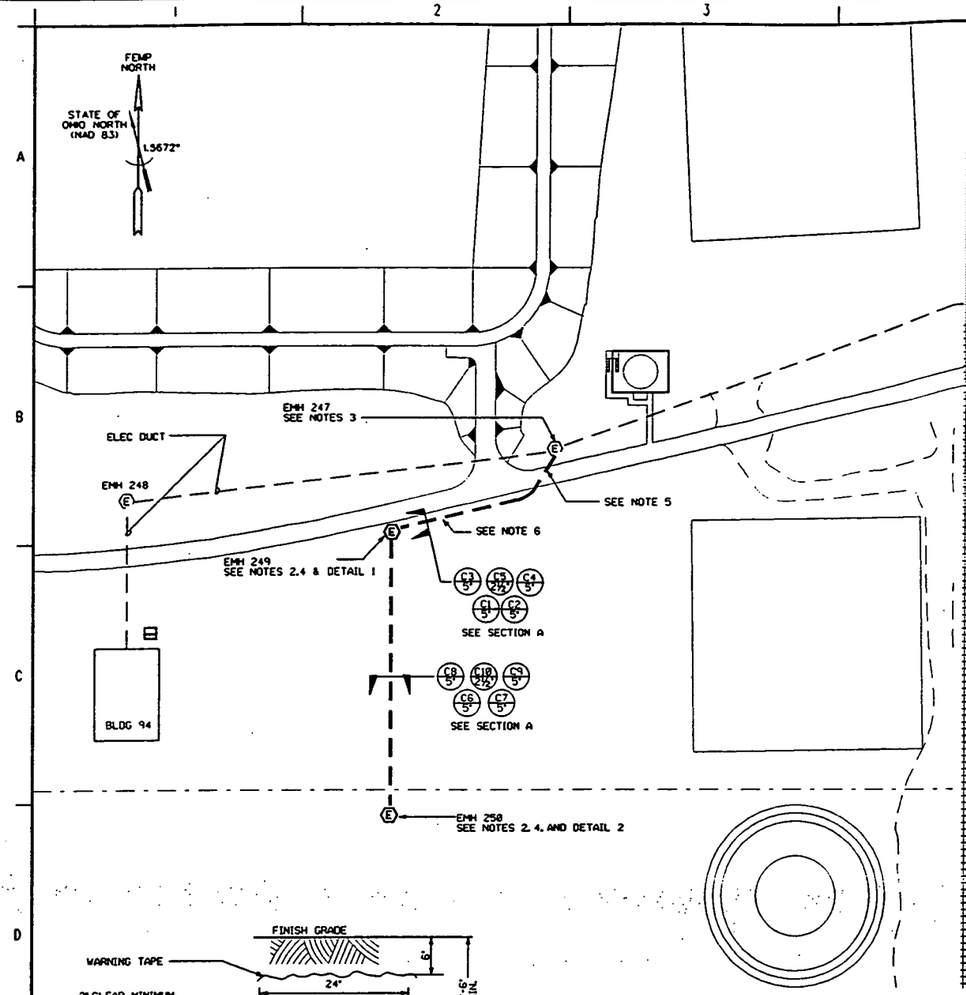
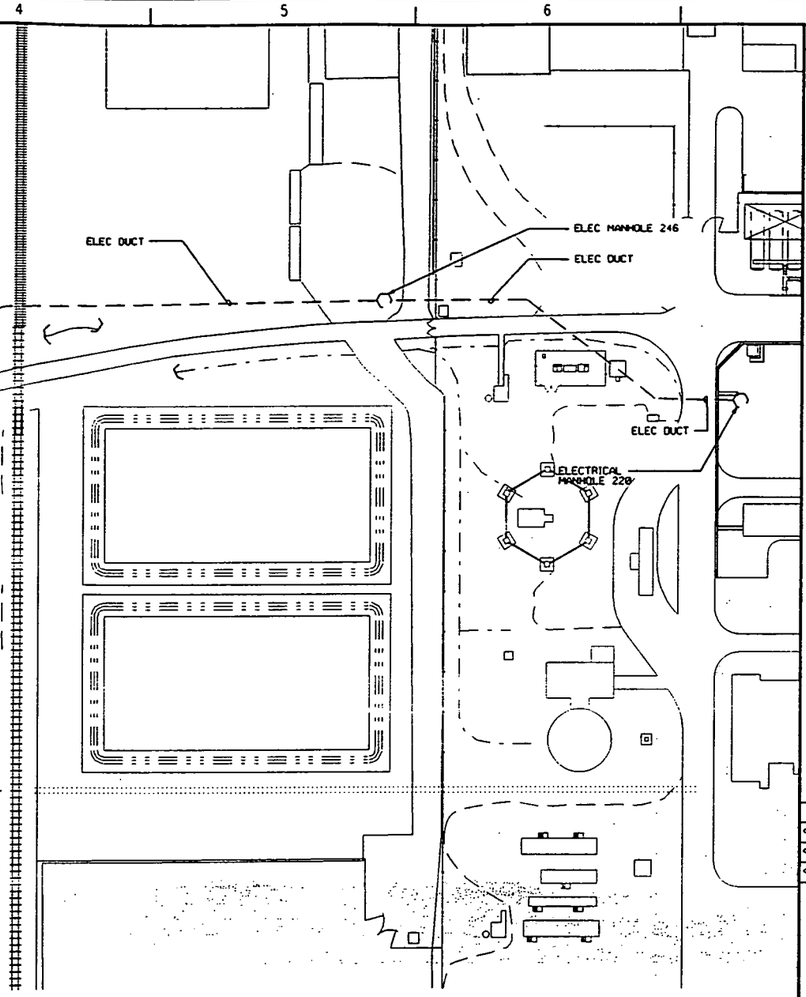
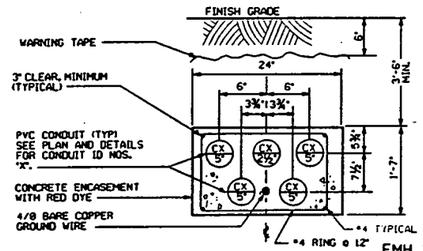




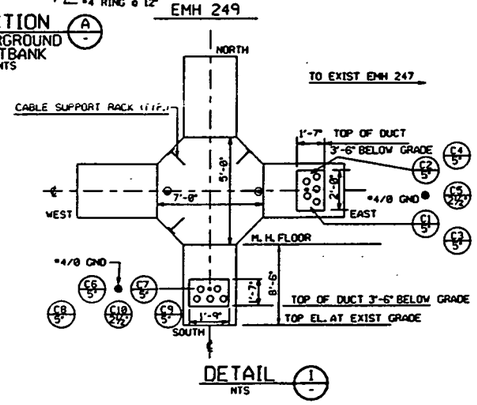
ELECTRICAL SITE PLAN

NTS



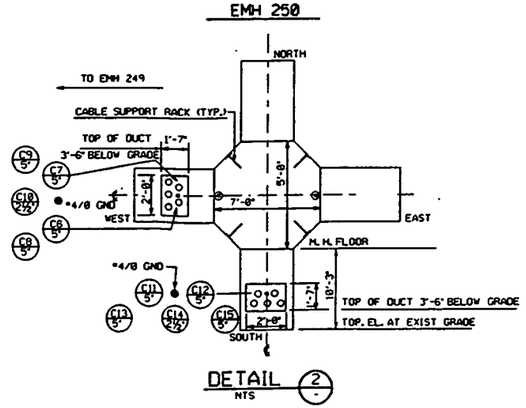
SECTION (A) UNDERGROUND DUCTBANK

NTS



DETAIL (1)

NTS



DETAIL (2)

NTS

NOTES

1. SEE DRAWING 94X-5900-X-00926 FOR DRAWING INDEX.
2. SEE DRAWING 94X-5900-G-00898, CIVIL - UTILITY PLAN, FOR SITE COORDINATES OF NEW ELECTRICAL MANHOLES.
3. PENETRATE SOUTH WALL OF EMH 247 WITH NEW DUCT BANK.
4. MANHOLE GENERAL NOTES:
   A. 6'-6" MIN. INSIDE CLEAR HEIGHT
   B. PROVIDE PULLING-IN IRONS IN WALLS OPPOSITE DUCT ENTRANCE
   C. PROVIDE 10'-0" X ¾" GROUND RODS ON EACH END OF 7'-0" DIMENSION.
   D. DIMENSIONS ARE APPROXIMATE.
   E. GROUND CABLE SUPPORT RACKS AND PULLING-IN IRONS WITH #8 COPPER GROUND CABLE.
   F. PROVIDE 27" ROUND MANHOLE COVER.
5. CLEAN FACE OF EXISTING CONCRETE. PROVIDE ½" DIA. EXPANSION ANCHORS WITH ½" DIA. THREADED RODS X 15" LONG AT 12" C/C. APPLY EPOXY BINDER TO FACE OF EXISTING CONCRETE BEFORE POURING NEW CONCRETE.
6. PROVIDE REINFORCING UNDERNEATH ROADWAYS AND WITHIN 10 FEET OF ROADWAYS.

E- 134

LEGEND:

- NEW FEATURES (HEAVY LINE WEIGHT)
- EXISTING FEATURES (LIGHT LINE WEIGHT)
- UNDERGROUND OR HIDDEN FEATURES (LIGHT LINE WEIGHT)
- (E) ELECTRICAL MANHOLE (EMH XXX)

REF DWG NO.	DRAWING TITLE
94X-5900-X-00926	DRAWING INDEX
94X-5900-E-00937	SINGLE LINE DIAGRAM
94X-5900-P-00898	UTILITY PLAN

000118

PRELIMINARY
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E INITIALS	FERNALD INITIALS	DATE
A	ISSUED FOR 90% DESIGN REVIEW			

UNITED STATES DEPARTMENT OF ENERGY
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

THIS DRAWING PREPARED BY
PARSONS
THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.
CINCINNATI, OHIO

PROJECT NAME
SITE PREPARATION / UNDERGROUND UTILITIES
FERNALD RESIDUES VITRIFICATION PLANT

DRAWING TITLE
ELECTRICAL
ELECTRICAL SITE PLAN
UNDERGROUND DUCTBANK ROUTING

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
J. ALLFORD	08/19/95			T. FERRELL	08/18/95

PCN/P/MOD. NO.	FLOOR	SCALE	CLASS
		NONE	

SUBMITTED FOR APPROVAL	FERNALD CRU APPROVAL	
A/E DATE	N/A DATE	N/A

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	A/E PROJECT NO.	FERNALD PROJECT NO.	DRAWING BOOK CODE NO.	SHEET NO.	REV. NO.
CRU4/PO146		WBS 1.1.1.4.3 00-90701	94X-5900-E-00938	E0001	A