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FINAL DESIGN, SILO SUPERSTRUCTURES FOR THE OPERABLE UNIT 4  
SILOS PROJECT

09/13/96

DOE-1337-96

DOE-FN

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DESIGN

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EPAS



## Department of Energy

Ohio Field Office  
Fernald Area Office  
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SEP 18 1996  
DOE-1337-96

Mr. James A. Saric, Remedial Project Director  
U.S. Environmental Protection Agency  
Region V - SRF-5J  
77 West Jackson Boulevard  
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager  
Ohio Environmental Protection Agency  
401 East 5th Street  
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

### FINAL DESIGN, SILO SUPERSTRUCTURES FOR THE OPERABLE UNIT 4 SILOS PROJECT

- Reference:
- 1) Letter, DOE-1135-96, Johnny Reising to Jim Saric (U.S. EPA) and Tom Schneider (OEPA), "Operable Unit 4: Submission of Comment Responses and Request for Extension of Submittal Period for the Silo Superstructure Final Design Package", dated July 17, 1996.
  - 2) Letter, DOE-1102-96, Johnny Reising to Jim Saric (U.S. EPA) and Tom Schneider (OEPA), "Transmittal of the Ohio EPA Comment Responses to the Preliminary Silo Superstructure Design for the Fernald Residues Vitrification, Project Number 40200", dated July 17, 1996.

Enclosed is your copy of the *Final Design of the Silo Superstructures for the Operable Unit 4 Silos Project, September 1996, Revision C*. This transmittal is provided to you with our responses to the U.S. Environmental Protection Agency (U.S. EPA) and the Ohio Environmental Protection Agency (OEPA) comments incorporated consistent with the reference letter.

Included within this Final Design package are the following documents:

- Operable Unit 4 Silos Project Silo Superstructure Design Drawings and Specifications (includes an electronic version on tape of the drawings for OEPA);

- "Assembly and Rigging Concept Plan;"
- Responses to the OEPA comments contained in the July 22, 1996, letter to the Department of Energy, Fernald Environmental Management Project (DOE-FEMP) on the Pre-final Silo Superstructure Design; and,
- Responses to the OEPA comments contained in the September 3, 1996, letter to the DOE-FEMP on the Preliminary Silo Superstructure design.

In addition to the incorporation of the U.S. EPA and OEPA comment responses, the Final design package includes the following:

- Further modular design of the bridge portion of the superstructure including additional structural steel details for connecting the pre-assembled modules to limit the extent of field welding;
- Incorporation of additional requirements for module assembly and shipment to limit the potential for damage during transport; and,
- Additional design details for lifting and placing the entire pre-assembled bridge section onto the towers using a two-crane approach.

The following previously transmitted design documents have not been included as no comment incorporation or other changes have occurred to these documents:

- "Permitting Plan and Environmental Regulatory Requirements for Remediation of Operable Unit 4 - Silo Superstructure Design for the FRVP, DRAFT - May 1, 1996;" and,
- "Soil Management for FRVP Silo Superstructure Construction."

If you have any questions or comments concerning this notification, please contact Nina Akgunduz at (513) 648-3110.

Sincerely,



Johnny W. Reising  
Fernald Remedial Action  
Project Manager

FEMP:Akgunduz

Enclosure: As Stated

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**Operable Unit 4  
Silo Superstructure Design  
for the Silos Project**

**FOR  
INFORMATION  
ONLY**

**Assembly and Rigging Concept Plan**

**Operable Unit 4  
Project Order 161  
WBS No. 1.1.1.1.4.3.2  
September 1996  
Revision C, Final**

**FERMCO Project No.: 40200**

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



**25 Merchant Street  
Cincinnati, Ohio 45246**

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**Operable Unit 4  
Silo Superstructure Design  
for the Silos Project**

**Assembly and Rigging Concept Plan**

**Operable Unit 4  
Project Order 161  
WBS No. 1.1.1.1.4.3.2  
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**000005**

**Operable Unit 4  
Silo Superstructure Design  
for the Silos Project  
Assembly and Rigging Concept Plan**

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**LIST OF ACRONYMS AND ABBREVIATIONS**

CG	Center of Gravity
D&D	Decommissioning and Dismantling
FEMP	Fernald Environmental Management Project
lbs	Pounds
RTS	Radon Treatment System

## SECTION 1

### INTRODUCTION

#### 1.1 Purpose of Plan

This plan presents several possible options for erecting silo superstructures, specifically rigging of the main trusses, at the Fernald Environmental Management Project (FEMP). The superstructures will be erected over Silos 1 and 2 (also known as the K-65 Silos). The superstructures are trusses mounted on towers that support a centrally-mounted equipment room. The equipment room will be used to house residue retrieval systems for the extraction and transport of low-level radioactive waste residues from the silos to the adjacent ~~verification plant~~ for treatment. This conceptual plan supplements the detailed design drawing package for the superstructures.

None of the proposed options are assumed to be inherently superior. Prospective rigging subcontractors may have a preference based on previous experience or availability of equipment. The preferred option for the site is that which provides for the safe erection of the superstructures with the lowest combined cost for rigging, site preparation and interference relocation.

Prospective subcontractors may be asked to bid on a specific option or on their preferred option. The ~~successful~~ subcontractor will ~~subsequently~~ submit for approval a detailed rigging and assembly plan. This plan has been prepared to provide information which will assist prospective subcontractors in the familiarization with the project. The ultimate responsibility for the successful planning, engineering, and execution of transportation, assembly, and rigging operations is incumbent upon the subcontractor.

#### 1.2 Description of the Silos

Built in 1952, Silos 1 and 2 are cylindrical, above-grade, post tensioned, concrete structures. Each silo is 80 feet in diameter and 36 feet high to the center of the dome. The silos lie on a north-south line, 120 feet apart from center to center. The silos are surrounded by a soil berm which runs from near the top of the 26-foot silo wall to grade, approximately 75 feet away, at a 3H:1V slope. The silos contain low level radioactive residues from the processing of high-grade uranium ore.

#### 1.3 Description of the Superstructure

The superstructure is a single comprehensive structure of modular design which supports the equipment room, vestibule, and associated equipment. The superstructure also provides access to platforms for the four outer manways and the retrieval equipment mounted there.

The main superstructure truss is approximately 236 feet long, 23 feet wide, and 14 feet high. The truss rests on, and is bolted to, two 39-foot-tall towers. The lowest point of the truss clears the silo dome by approximately 1½ feet when positioned on its towers. The two towers are fabricated as separate modules. The west tower includes the stairwell and the east tower includes the ladders and monorail access platforms. The Equipment Room is centered over the silo dome and is approximately 30 feet high, 16 feet wide, and 30 feet long. Four equipment handling (manway access) platforms provide access at the lower level to the four outer manways. These platforms will be used to install and adjust equipment (water nozzles, radon treatment connections, and camera systems) which will be deployed through these manways.

The west tower has a stairway for normal personnel access. A ladder on the east tower is provided for emergency egress. A monorail and hoist are located at the east tower to raise and lower equipment to truss height on the superstructure. Walkways and areas of normal access on the structure are provided with ¼ inch thick steel checkered plate which supports traffic and provides minimal personnel shielding. The Equipment Room and Vestibule floor area includes a 1-inch-thick steel plate for shielding in addition to the ¼ inch checkered plate.

#### 1.4 Description of Options

This plan provides three different lifting concepts to install the completely assembled main truss over the silos on support towers while remaining essentially clear of the silo berm. The options are as follows:

##### Option 1 - Two Walking Cranes

The superstructure truss would be used as a long lifting beam. Crawler cranes located at either end of the truss would lift and walk each truss into place.

##### Option 2 - One Crane

One large crane would be used to lift the truss and swing or walk it into place.

##### Option 3 - Two Ringer Cranes

Two ringer cranes would be used to pick each truss up and swing it into place. As this requires the truss to be swung between the cranes, one crane would lead while the second follows.

## 1.5 Goals of Modular Concept for Assembly and Rigging

A modular concept has been selected for the fabrication, transportation, and erection of the superstructures. In this concept, the superstructures and equipment rooms are fabricated in modules and shipped to the site. The superstructure tower modules are erected on pre-installed foundations. The main truss (including hard mounted equipment, the equipment room, walkways, dome cutting platform, four access platforms, and other peripherals) is assembled at grade level and lifted onto the towers in a single lift. This concept will maximize the following objectives for the project:

- 1) Perform as much fabrication as possible away from the site in the controlled environment of a fabricator's shop. Working in a familiar environment with standard tools and procedures will allow a fabricator to reduce cost and time for construction. It will additionally improve the quality and overall workmanship of the finished product.
- 2) Reduce the number of hours of work required within radiation areas around the silos. In particular the higher radiation areas adjacent to, and immediately above, the silo domes.
- 3) Reduce the number of hours of work performed overhead in the assembly of the superstructure. This will increase the efficiency of the work and reduce the chance of accidents and injury due to falls.
- 4) Limit the number of lifts of heavy equipment over the silo domes to increase personnel safety and reduce the possibility of damage to, or breach of, the dome by falling objects during installation.

## SECTION 2

### SHOP CONSTRUCTION AND TRANSPORTATION

The three options presented by this plan are based on the same shop construction and transportation requirements. One slight difference in the alternatives is the lifting locations required for a single crane lift versus a two crane lift.

#### 2.1 Shop Construction

The superstructure components will be fabricated in large modular units to meet the first goal discussed in Subsection 1.5. Shop fabricating the trusses, equipment rooms, and towers will remove a significant portion of the assembly hours at the FEMP, resulting in reduced rates, better productivity, increased quality, and less schedule risk. Prior to transportation to the site, the modules will be temporarily assembled by the fabricator and inspected to ensure correct fit-up.

The main truss has been divided into seven main modular units with the maximum overall size being 48 feet long, 23 feet wide, and 14 feet high. The equipment room and vestibule are comprised of four modules which are mounted inside the truss. Additional modules are then added to provide the manway access platforms and walkways. Figure 2-1 provides an isometric view of the complete superstructure while Figure 2-2 shows how the individual modules are arranged. Table 2-1 provides the overall sizes of the modules. When the modular trusses arrive at the site, they can be quickly assembled, thus reducing field hours and schedule.

Module	Size (approximate envelope dimensions) (L x W x H) (ft)
Main Truss	
T-1	43.5 x 23 x 14
T-2	48 x 23 x 14
T-3	20 x 23 x 14
T-4	22 x 23 x 14
T-5	17 x 23 x 14
T-6	39 x 23 x 14
T-7	47.5 x 23 x 14
Attachments to Main Truss	
TR-1	12 x 10 x 21
TR-2	12 x 10 x 21
TR-3	8 x 10 x 21
TR-4	8 x 10 x 21
TR-5	27 x 23 x 13
TR-6	18 x 18 x 8
TR-7	30 x 5 x 5
TR-8	24 x 5 x 5
TR-9	18 x 23 x 14
TR-10	18 x 23 x 14
End Towers	
WT	23 x 14 x 39
ET	27 x 14 x 39
Equipment Room Enclosures	
EN-W	11 x 18 x 31
EN-C	11 x 18 x 31
EN-E	11 x 18 x 31
EN-VEST	27 x 18 x 14

Table 2-1 - Truss Module Sizes

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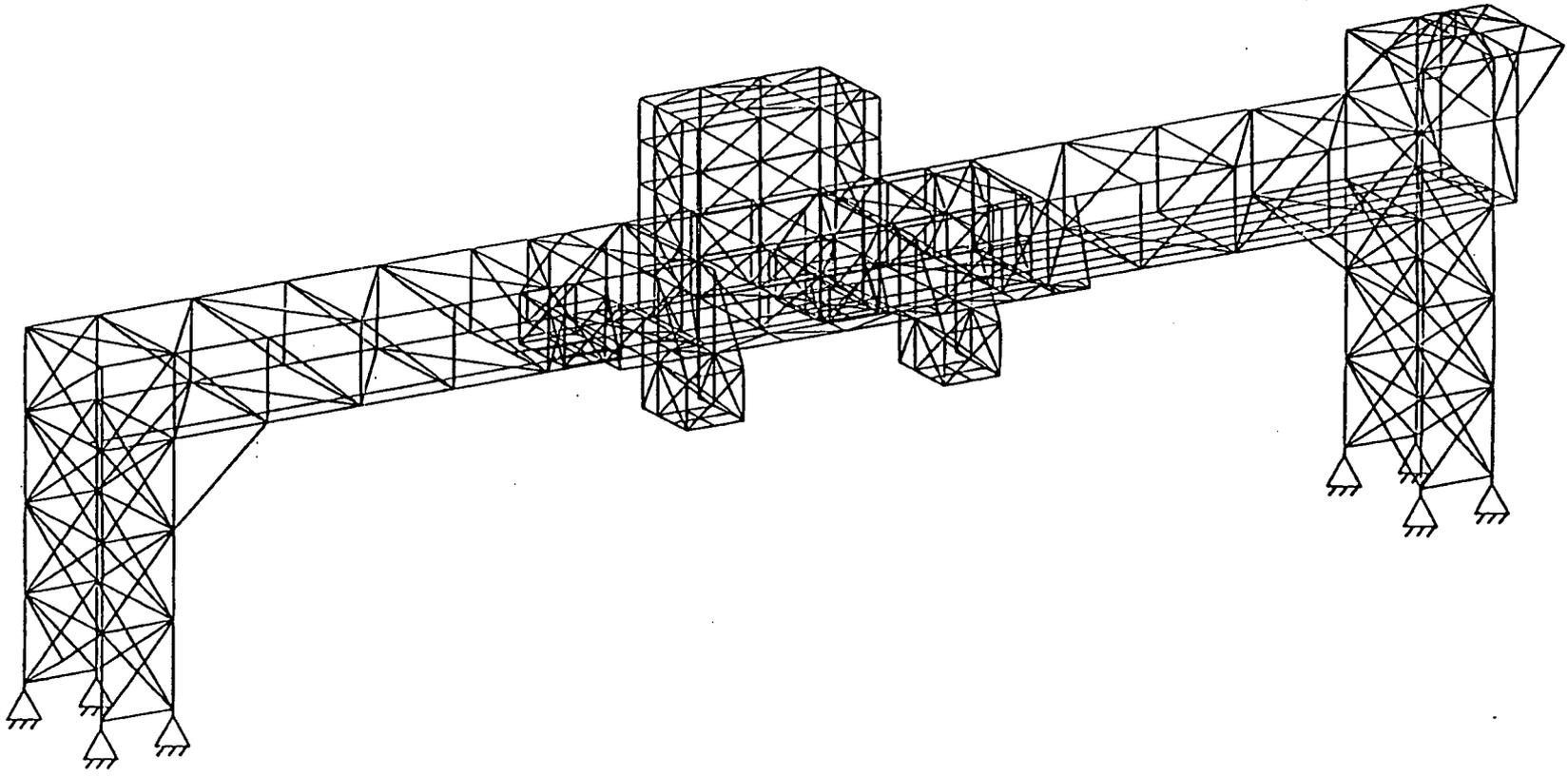


Figure 2-1 - Superstructure Isometric View

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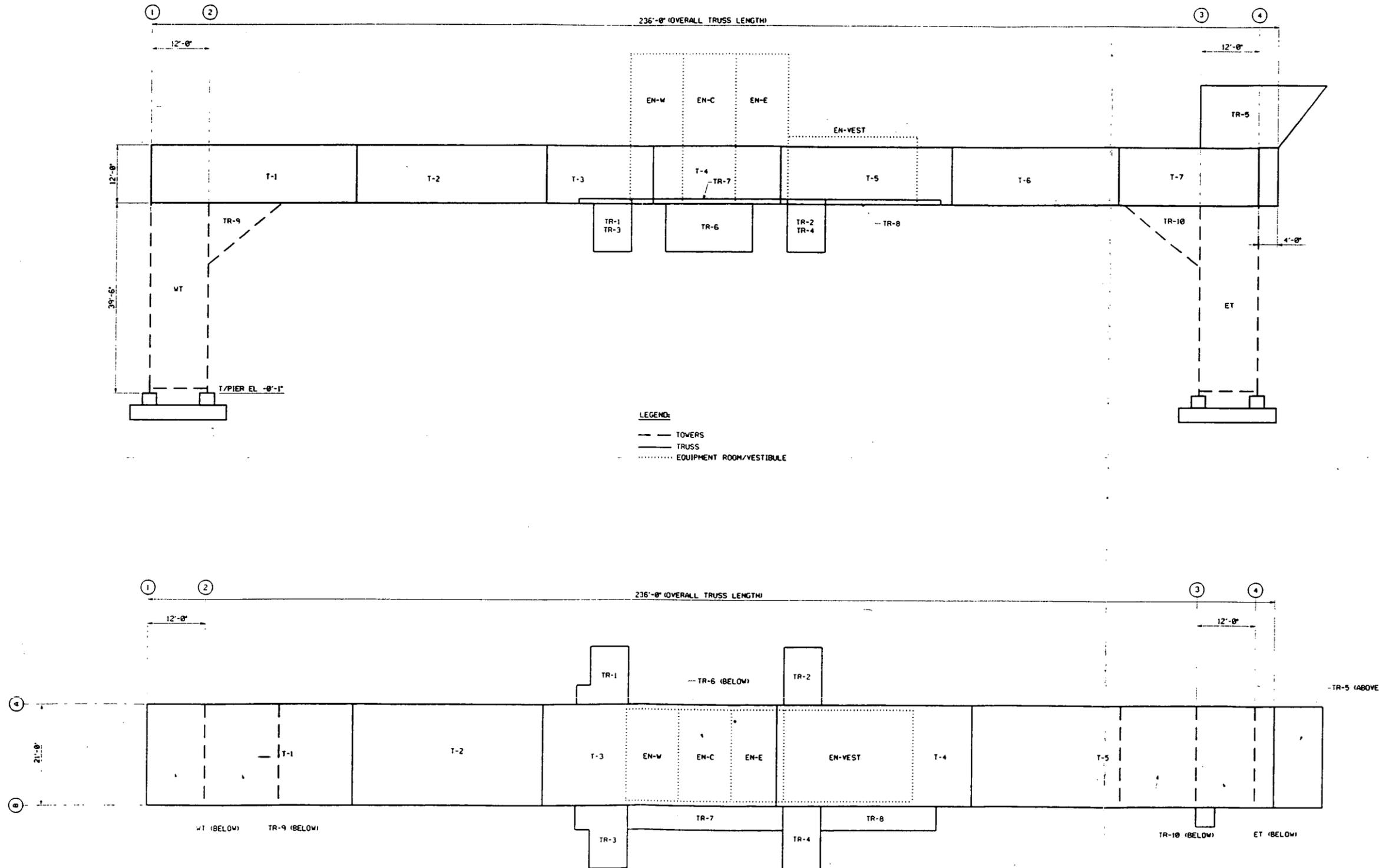


Figure 2-2 - Superstructure Modular Arrangement

## 2.2 Transportation to the FEMP

Transport of the modular units to the site could result in unique transport arrangements for several of the larger modules. The subcontractor will be responsible for visiting the site, selecting the actual transportation route (complete to final staging area) to be used, and verifying the size/load limitations for transport along the selected route. It is the responsibility of the fabricators to deliver the superstructure modules to the assembly area at the FEMP in a straight and true, undamaged condition. If the subcontractor deems it desirable, or necessary, to fabricate the larger or heavier modules in multiple smaller units for transport to the site, any proposed alterations to the current modular plan would require approval by FERMCO.

The FEMP is accessible by several routes from Interstate Route 275 (I-275) around Cincinnati. Two possible routes are described below and shown on Figure 2-1. It is the subcontractor's responsibility to select the transportation route and determine load and size restrictions that apply to the selected route.

### Route A

Take Exit 33 off of I-275 and head north on Colerain Avenue (Route 27). Pass under two bridges (Kemper Road and E Miami River Road bridges) and exit onto Route 128 and travel west under the Route 27 overpass. Route 128 west travels through the town of Ross. In Ross, there are two options. The primary entrance to the FEMP is accessible by continuing on Route 128 to Willey Road, turning right on Willey Road, and travelling approximately 1/2 mile. The secondary entrance to the FEMP is accessible by taking Route 126 north to the north entrance of the FEMP. Figure 2-1 provides a map of the local area.

Note: Bridges at Kemper Road and Route 27 do not have clearance heights currently posted. The clearance height must be obtained from Ohio DOT prior to any shipment to the FEMP via this route. The E Miami River Road bridge does not have a posted clearance height, however, this bridge is very high and will not present a danger to oversized loads.

### Route B

Take Exit 7 (Cleves, Hamilton exit) off of I-275 and head north on Route 128. As mentioned in the previous paragraph, the site can be accessed via either the main entrance off Willey Road or the North entrance off Route 126.

Note: There are no overpasses on this route to the FEMP. However, there are many overhead power lines, especially in Miamitown, that may be low enough to entangle on an oversized load.

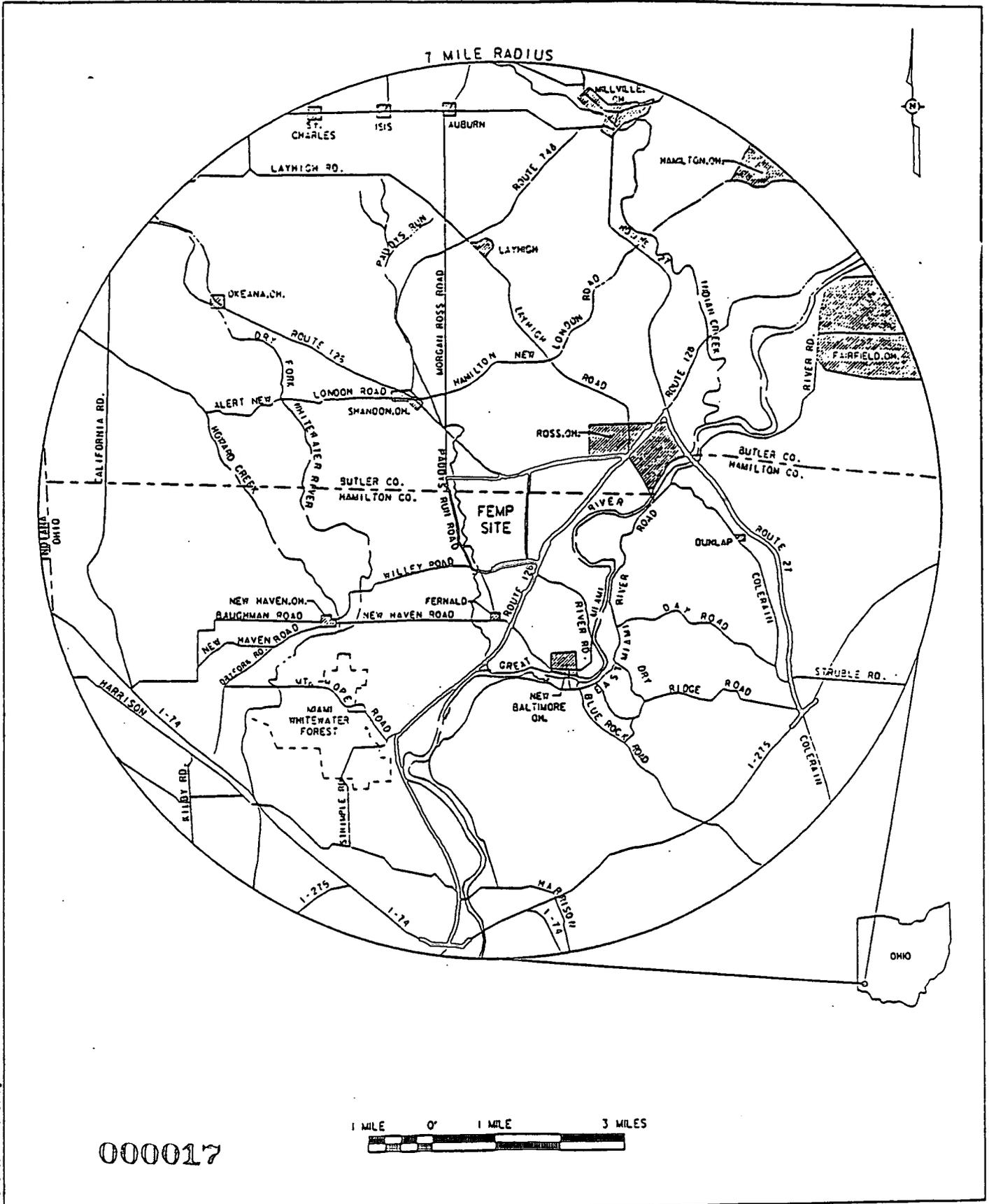


Figure 2-3 - Local Transportation Routes

## SECTION 3

### SILO AREA PREPARATION

#### 3.1 Topography, Laydown Areas, and Crane Locations

The topography of the silo area is provided on a site plan in Figure 3-1. The area around the silos is primarily flat and slopes west toward Paddys Run creek. On the west side of the silos the ground falls sharply away towards Paddys Run, approximately 80 feet from the western edge of the berm at its closest point. The berm around Silos 1 and 2 is approximately 26 feet high and has a 3H:1V slope.

Approximately 180 feet from the southern edge of the silo berm is a natural ditch that runs east-west. The areas north and east of the site are relatively flat; major obstructions consist of the Vitrification Pilot Plant, Silo 3, and the Radon Treatment System.

The three options presented by this plan are largely based on accommodating the physical constraints of the silo area. The proposed laydown areas and crane locations for the three options are shown in Figures 5-1, 5-2, and 5-4.

#### 3.2 Interferences

There are several potential interferences in the silo area which are described below. Table 3-1 provides a list of the interferences which may be encountered for each specific option. Typically these interferences will be removed by FERMCO; however, some must be worked around and protected. The extent of interference shall be identified as part of the subcontractor's rigging option determination and will be included as bid evaluation criteria.

##### Silo Area Fence

A 6-foot chain link fence surrounds Silos 1 and 2. Effected areas of the fence will require relocation by FERMCO prior to arrival of the subcontractor.

##### Electrical Utilities

Electrical utilities are routed along southern and eastern portions of the silo area fence and are connected to a distribution board just north of Silo 2. These must be relocated under all options. Relocation will be performed by FERMCO.

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### Light and Security Towers

Light towers are located just north of Silo 2 and south of Silo 1. These towers are also equipped with security cameras. Light poles are also located east and west of Silos 1 and 2. FERMCO will provide for the necessary relocation of lighting and security cameras in the silo area.

### Radiological Monitors

A series of air and radon monitors are located around the silos. The monitors will be required to remain in operation throughout remediation of the silos but their configuration and specific locations may be altered to relieve potential interference. Modifications to the monitoring system will be evaluated by FERMCO to provide continued regulatory radiological monitoring without interference with construction activities.

### Monitoring Wells

A network of monitoring wells are located west of Silos 1 and 2. The well locations are shown in Figure 3-3. The wells are typically housed in a 2½-foot protective housing mounted on a poured concrete pad. Abandonment of some existing wells may be required. FERMCO will be responsible for well abandonment, as needed.

### Pilot Plant Pipe Rack

An overhead pipe rack runs from the east side of Silo 2 to the existing Vitrification Pilot Plant. This will not be relocated and, therefore, must be avoided.

### K-65 Trench

The K-65 Trench (a concrete pipe trench) runs from the former process area to the silos. The trench is approximately 2½ feet wide and 3 feet deep. The trench is covered with a 3/16-inch thick steel plate cover. The trench contains active utility lines. Affected areas of the trench need to be provided with protection by the subcontractor.

### Radon Treatment System

System components of the Radon Treatment System (RTS) are housed in a heavily shielded building located northeast of Silo 2. This system is currently required to be available through erection of the silo superstructures when it will be replaced by a New Radon Treatment System. Decontamination and dismantling (D&D) of the RTS by FERMCO is currently scheduled concurrent with D&D of the silos; therefore, the RTS building needs to be avoided and worked around.

### Stormwater Management Trench

A concrete trench approximately 1½ by 1½ feet is located around the perimeter of the silo area berm. This trench helps maintain control of run-off and run-on of stormwater from the potentially contaminated silo area. Depending on the selected option, action must be taken by the subcontractor to maintain stormwater control during crane movement and rigging operations.

### Gravel Roads

There are gravel roads just west and south of the silos that may require closure and/or rerouting. These actions would be performed by FERMCO based on the relocation option.

Table 3-1 - Interferences

Interference	Option #1	Option #2	Option #3
Silo Area Fence	X	X	X
Electrical Utilities	X	X	X
Light and Security Towers	X	X	X
Radiological Monitors	X	X	X
Monitoring Wells	X		
Pilot Plant Pipe Rack			
K-65 Trench	X	X	
Radon Treatment System			
Stormwater Management Trench	X	X	X
Gravel Roads	X	X	X

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## SECTION 4

### ON-SITE ASSEMBLY

In all options considered, the trusses will be fully assembled on the site (including the manway access platforms and dome cutting platform) prior to lifting the trusses in place. Options 1 and 3 will require module TR-5 to be installed after the truss is set due to lifting lug interferences. As the truss modules arrive on site, they will be off-loaded with a crane, aligned to the other modules in the superstructure staging and assembly area. The design approach for handling of the main truss modules during assembly utilizes simple support along the width of each module using a spreader bar at either end until the modules are connected, the main truss is fully assembled, and ready for erection. Field bolting will be required to complete the assembly. The trusses may be left near grade while the majority of the truss and equipment room are assembled, permitting easy access to the work by assembly personnel.

After assembly of the main truss modules, the four manway access platforms and a dome cutting platform will be installed. This may be performed using the lift cranes to raise the truss up 9 feet, supporting the ends on shoring, cribbing, or hydraulic gantries while the manway platforms are installed. The platforms will be pre-assembled to the maximum extent possible to further expedite installation.

The tower modules will be shop assembled with stairways in place and transported to the site as a single module. Modules TR-9 and TR-10 will be attached to the towers prior to lifting the main truss. These modules can be assembled on their respective towers either prior to, or after, the towers are erected. The lifts of the towers could be done using either of the two lift cranes. First the boom lengths would be lengthened, then a tractor/trailer would bring the towers to the crane and the crane would pick the tower off the trailer, walk it to its foundation, and set it. The towers are lifted onto the pre-installed concrete foundations and are bolted in place.

Once the truss is assembled, residue retrieval equipment, support equipment, piping, electrical, instrumentation, and utilities will be installed on the truss, as appropriate. The intent, in all cases, is to maximize the work which can be completed in the laydown area, including all check-out work, loop tests, hydrostatic tests, functional check-outs, etc., prior to the lifting.

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## SECTION 5

### SUPERSTRUCTURE TRUSS ERECTION

#### 5.1 Two Walking Cranes

The first option uses two crawler cranes to lift the complete truss from its assembly area, south of Silos 1 and 2. The two cranes would then slowly walk along specially constructed crane pads to transport the truss to its final position and set it on the previously erected tower supports. Figure 5-1 provides the proposed layout of the crane pads for this option.

The area south of Silo 1 will be used to assemble the truss components. This particular area, however, is fairly steep and will require some excavation and filling to provide a level assembly area. A temporary road from the southwest gate and staging area for a truck crane to unload the modules is also needed. If the trusses were assembled further to the south, then the fill required for the cranes would need to be lengthened to the south plus the added matting and compaction. To eliminate additional crane walkways for Silo 1's initial lift location, Silo 2's assembly can be winched north on rollers to the lift location. This would save about 30 to 40 feet of crane walkways.

Prior to the lift, the truss would be weighed using jacks and calibrated load cells to determine the total weight of the truss and the center of gravity. The center of gravity in both longitudinal and horizontal planes (X and Y) determines the load at each crane and the load in each sling and end. To allow clearance to the crane boom on the east end, the steel module above the top chord (TR-5) must be left out. Each crane walks on 12-inch-thick crane mats to spread the crawler loads into the ground and eliminate any local soil discontinuities. A wind gage would be installed to monitor local conditions and the weather forecast should be checked for anticipated wind conditions.

The maximum wind load the cranes can take and the allowable maximum wind condition for the lift shall be determined by the subcontractor. Each crane would also be equipped with calibrated load indicators to further monitor the lift. Lifting would be done at the extreme ends of the truss to maximize clearance to the crane boom and minimize the operating radius which allows efficient use of the crane's lifting capacity. The size of cranes required for the pad location shown in Figure 5-1 are in the range of 400 tons.

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Construction of the crane pads closer to the superstructure tower foundations it would make it possible to utilize smaller cranes for the lift. The presence of the existing stormwater controls, however, would complicate the construction of crane pads in this area. With the cranes located closer to the superstructure towers a capacity of 250 to 300 tons would be necessary. There are a large number of types of cranes of this size in the United States (i.e., Manitowoc 4100W or Link Belt 718). Figure 5-2 shows the position of a crane pad which accommodates a Manitowoc 4100W S-2 and straddles the existing drainage trench on the west side of the silos.

Normally a lift of this type over a sensitive area requires some reduction in lifting capacity. The DOE Hoisting and Rigging Manual (DOE/ID-10500) does not specify a set requirement. A reduction of rated crane capacity to 80 percent is in the range used in refineries when a lift is made over, or in close proximity to, operating lines and facilities. Table 5-1 lists the percent of chart capacity for several cranes using a boom length of 100 feet and a lift radius of 22 feet.

Table 5-1 - Typical Cranes and Capacities

Manufacturer	Model	Capacity (pounds)	Load + Offset + Rigging (pounds)	Percent of chart capacity
Manitowoc	4100W S-2	316,200	250,000	79
Link Belt	LS-718	376,560	250,000	66

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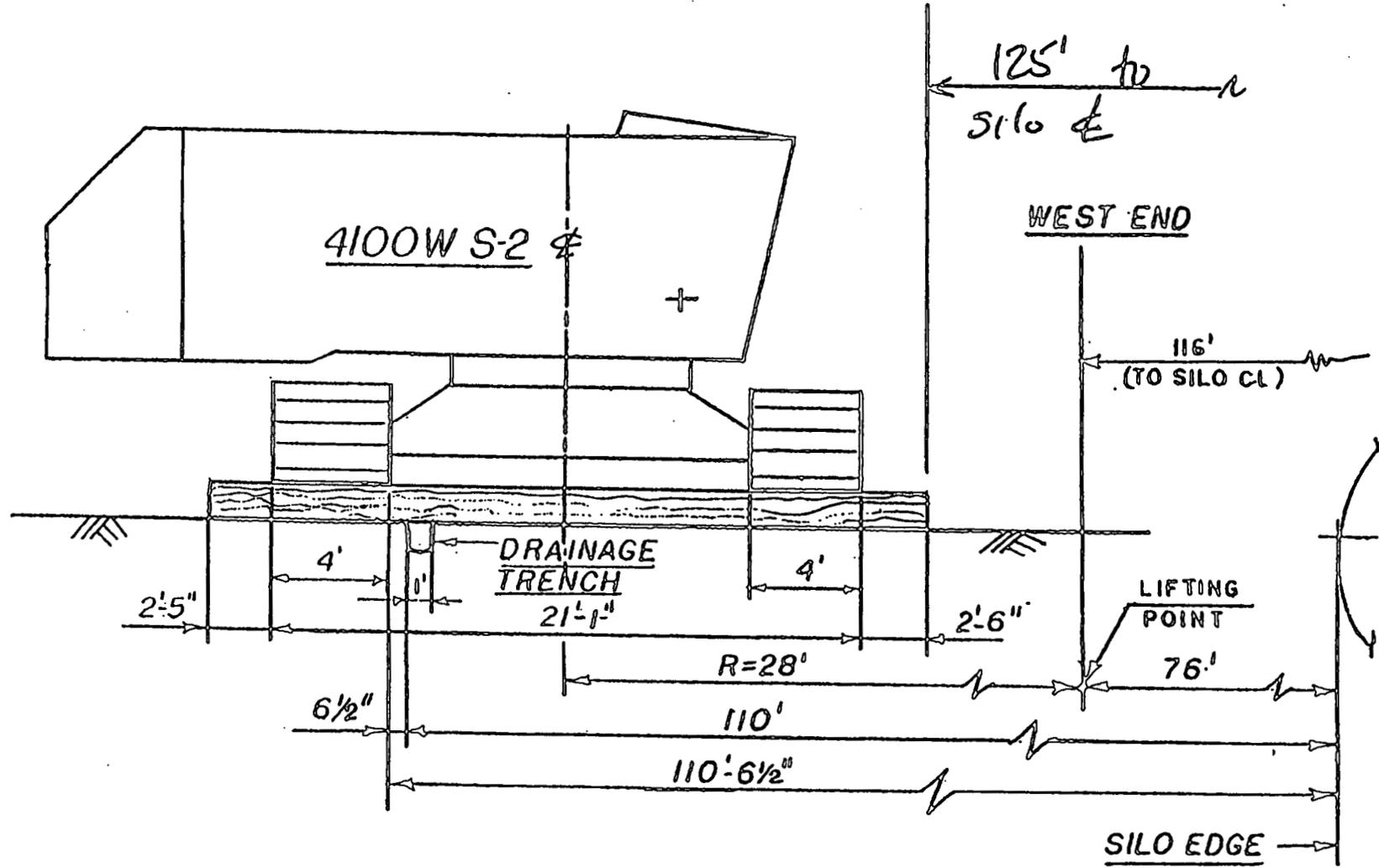


Figure 5-2 - Manitowoc 4100W on Crane Pad

## 5.2 Single Crane Lift

The second option calls for each truss to be lifted using a single crane. The trusses for this lift would be assembled south of the vitrification plant and skewed in an east by northeast direction to take advantage of the flatter ground and allow assembly of the long boom of the lift crane which would be east of its location. Being in a flatter location eases the unloading and assembly of the truss modules. Access to this location for transport of the trusses and crane components would be through the southwest gate.

Lifting with a single crane from the east allows the entire truss and equipment room (including the east tower monorail module, TR-5) to be completely assembled and inspected prior to placement. The estimated load (400,000 pounds) and lifting radius (170 feet) require a very large crane, of which there are few in the United States. At 80 percent of chart capacity and a lifting radius of 170 feet, the only cranes identified that are capable of making the lift are a Lampson 900, 1,000-ton Transi-Lift, or Deep South's M1200.

The Transi-Lift would be equipped with 240 feet of main boom and 130 feet of mast with 1,800,000 lbs of auxiliary counterweight at a 65-foot stinger length. There are approximately 10 or fewer of these cranes in the United States. This is a very large crane with a very large tail swing. Ground preparation must be done for both the front crawler and rear crawler. Generally this requires backfill and double layers of mats.

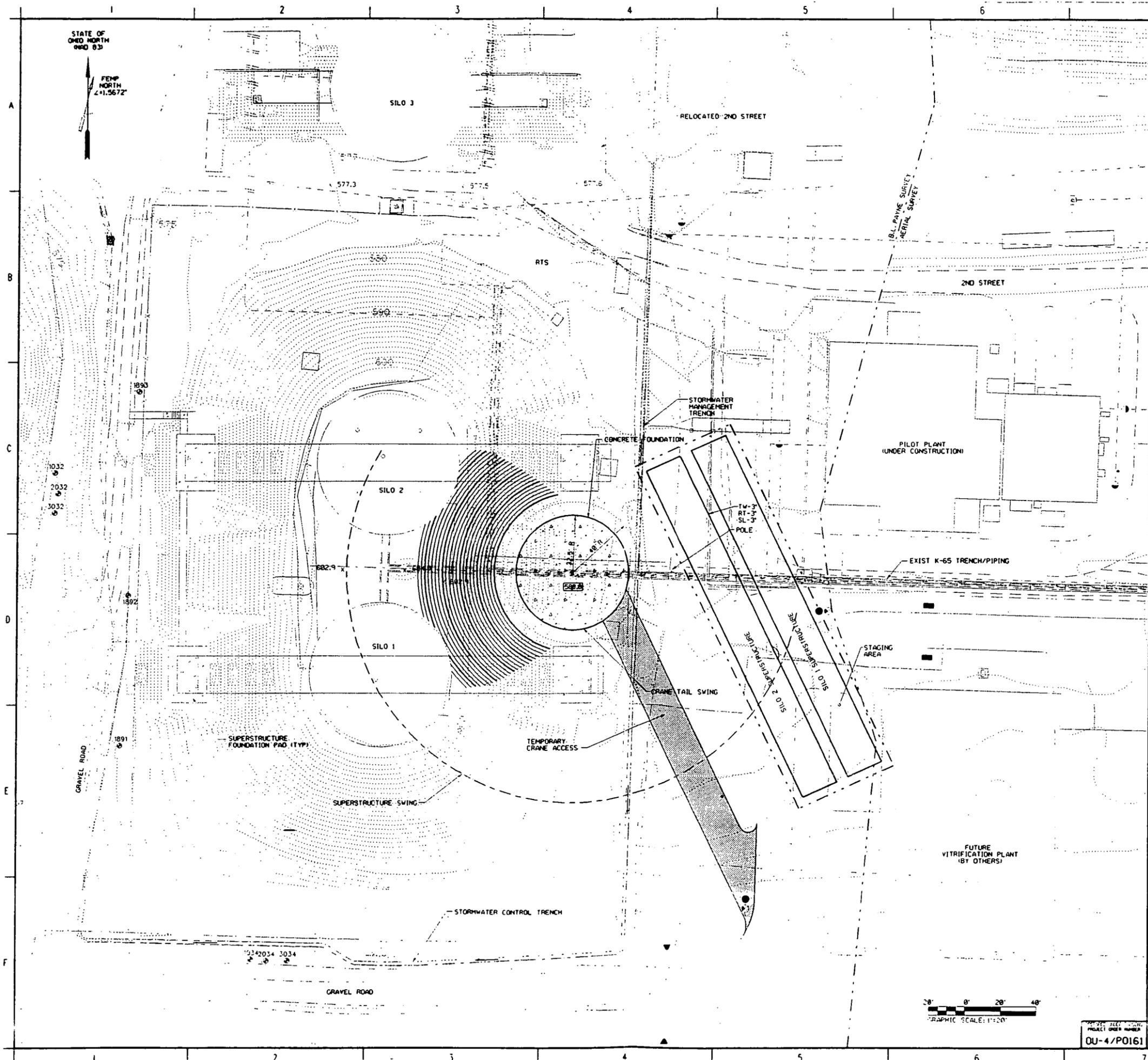
Alternately, Deep South's M1200 is a modular truck crane of which there is only one in the United States. It has a good ability to spread its outrigger loads over a wide area. Since it is a truck crane, it cannot walk with the load; it can only swing and boom. Figure 5-3 provides additional details specific to the Deep South M1200.

A significantly smaller crane could be used to achieve the single crane lift if the silo berms were to be excavated and a crane pad constructed. Figure 5-4 illustrates the extent of excavation necessary to allow the placement of a Manitowoc 4600 S-4 crane equipped with a S3 Ringer and 140-foot boom. There is a trade off however, in the extent of excavation required and the cost and availability of a smaller crane.

000027



skg04302.m po161@ws317.Thu Aug 29 12:33:18 CDT 1996



- NOTES
1. CONTRACTOR SHALL PROTECT, RELOCATE, AND/OR REMOVE ALL ROADS, UTILITIES, STORM DRAIN SYSTEMS, SURFACE FEATURES, AND STRUCTURES.
  2. PLANS AND DETAILS SHOWING PROTECTION, REMOVAL, GRADING, SEDIMENT CONTROL, AND RELOCATION ACTIVITIES SHALL BE SUBMITTED TO FERMCO FOR APPROVAL PRIOR TO CONSTRUCTION.
  3. NOTIFICATION SHALL BE GIVEN TO FERMCO OF ALL MONITORING WELLS THAT NEED TO BE ABANDONED FOR APPROVAL. FERMCO IS RESPONSIBLE FOR WELL ABANDONMENT.
  4. MAINTAIN STORMWATER DRAINAGE CONTROLS.

**SYMBOLS LEGEND**

EXISTING	PROPOSED
	POWER POLE
	LIGHT POLE
	MANHOLE (M)
	MONITORING WELL
	GRAVEL WALK ROADWAY/DRIVEWAY
	PAVED ROADWAY/DRIVEWAY
	CONCRETE PAD/FOUNDATIONS
	TEMPORARY CRANE PAD
	BUILDING/TRAILER
	FENCE
	TREE LINE
	SPOT ELEVATION
	CONTOUR - MINOR
	CONTOUR - MAJOR

**PRELIMINARY**  
NOT FOR CONSTRUCTION

B	ISSUED FOR FINAL EPA REVIEW	N/A
A	ISSUED FOR 90% RIGGING AND ASSEMBLY CONCEPTUAL PLAN	N/A
REV.	ISSUE OR REVISION PURPOSE - DESCRIPTION	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  
**SILO SUPERSTRUCTURE DESIGN RIGGING AND ASSEMBLY CONCEPTUAL PLAN**

DRAWING TITLE  
**CIVIL SITE LAYOUT AND GRADING OPTION #2**

DRAWN BY D.J. FOX	DATE 04/01/96	LEAD CHECKED BY K. GERARD	DATE 04/04/96	ORDERED BY K. GERARD	DATE 04/04/96
PROJECT/DC NO.	FLOOR	SCALE	CLASS	1"=20'	
SUBMITTED FOR APPROVAL		FERMCO OR APPROVAL		N/A	

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OU-4/PO161 40200 WBS 1.1.1.1.4.32 00-90701 SK-G-04302 G0002 A

Figure 5-4 - Site Layout and Grading, Option 2

### 5.3 Two Ringer Cranes

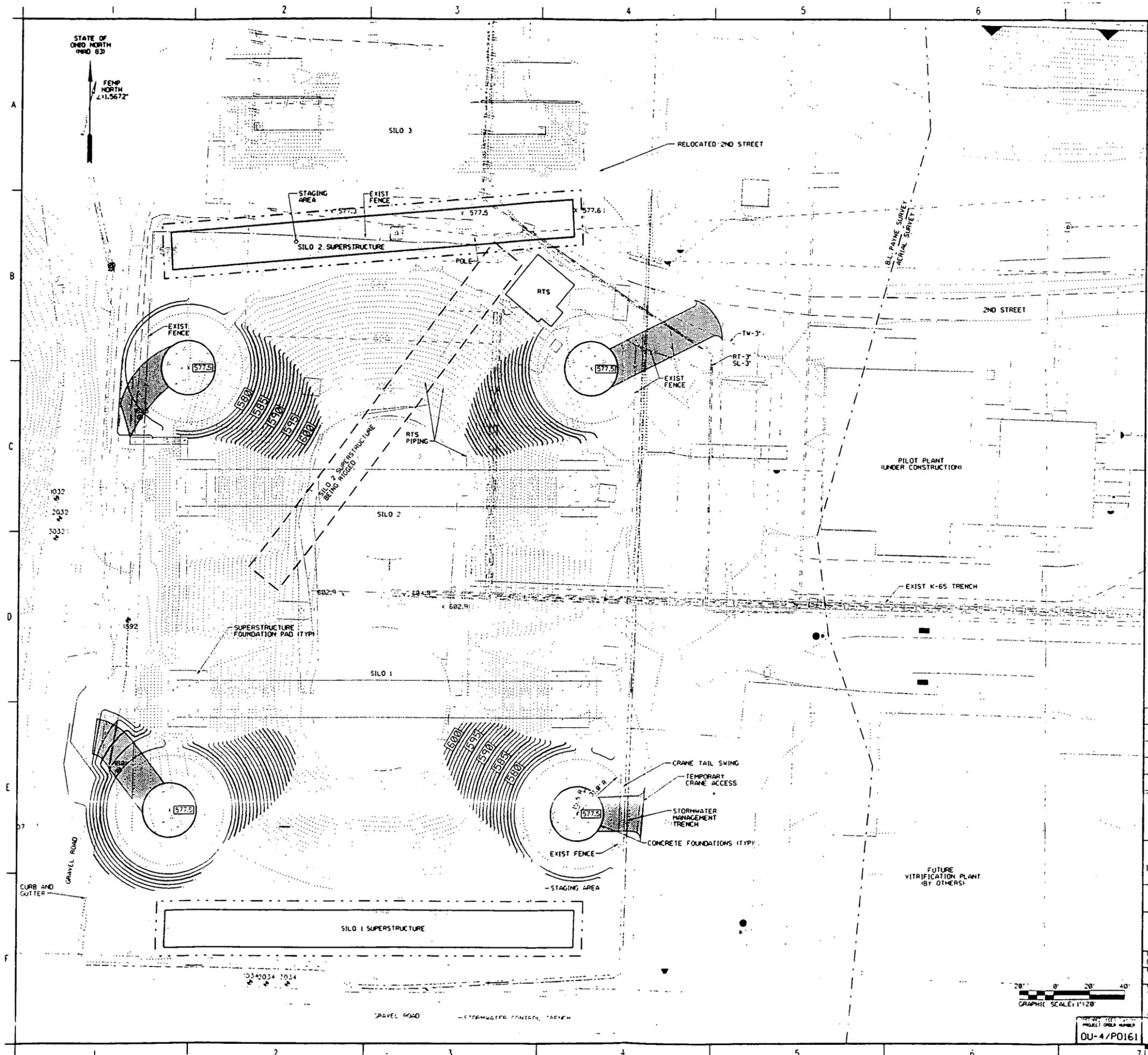
This method of lifting requires the cranes to be fixed, and move the truss into position by swinging and booming up and down. Figure 5-5 provides the layout of the cranes for this alternative.

The Silo 1 truss is lifted from the staging location discussed in Subsection 5.1 and the Silo 2 truss is lifted from a location between Silos 2 and 3. The Silo 2 truss staging area is a more restrictive location for unloading and assembly of truss modules and would require a slightly skewed position to avoid interfering with the RTS building.

Once the first truss is installed, the cranes would be jacked up and the cribbing beneath the ring removed. Most of the auxiliary counterweight would be removed prior to moving the crane to the next lifting location. The travel route requires good ground conditions with moderate grades. The actual lift has one crane leading while the second crane follows so that the truss passes between the two cranes. The layout shows the general travel route of each truss end as the cranes swing and boom in and out. Cross sections of the boom at the top of the truss show the true clearance to each crane boom.

000030

skg04303.m pl61@ws317. Thu Aug 29 12:39:27 CDT 1996



- NOTES
1. CONTRACTOR SHALL PROTECT, RELOCATE, AND/OR REMOVE ALL ROADS, UTILITIES, STORM DRAIN SYSTEMS, SURFACE FEATURES, AND STRUCTURES.
  2. PLANS AND DETAILS SHOWING PROTECTION, REMOVAL, GRADING, SEDIMENT CONTROL, AND RELOCATION ACTIVITIES SHALL BE SUBMITTED TO FERMCO FOR APPROVAL PRIOR TO CONSTRUCTION.
  3. NOTIFICATION SHALL BE GIVEN TO FERMCO OF ALL MONITORING WELLS THAT NEED TO BE ABANDONED FOR APPROVAL. FERMCO IS RESPONSIBLE FOR WELL ABANDONMENT.
  4. MAINTAIN STORMWATER DRAINAGE CONTROLS.

**SYMBOLS LEGEND**

EXISTING	PROPOSED
	POWER POLE
	LIGHT POLE
	MANHOLE (MH)
	MONITORING WELL
	GRAVEL WALK ROADWAY/DRIVEWAY
	PAVED ROADWAY/DRIVEWAY
	CONCRETE PAD/FOUNDATIONS
	TEMPORARY CRANE PAD
	BUILDING/TRAILER
	FENCE
	TREE LINE
	SPOT ELEVATION
	CONTOUR - MINOR
	CONTOUR - MAJOR

**PRELIMINARY**  
NOT FOR CONSTRUCTION

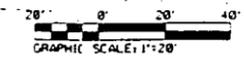
B	ISSUED FOR FINAL EPA REVIEW	N/A
A	ISSUED FOR 98% RIGGING AND ASSEMBLY CONCEPTUAL PLAN	N/A
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	DATE

**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  
**SILO SUPERSTRUCTURE DESIGN**  
DRAWING TITLE  
**RIGGING AND ASSEMBLY CONCEPTUAL PLAN**

**CIVIL**  
**SITE LAYOUT AND GRADING**  
OPTION #3

DESIGNED BY D.R. FOX	DATE 04/01/96	DESIGNED BY K. GERARD	DATE 04/04/96
SCALE 1"=20'	SCALE 1"=20'	SCALE 1"=20'	SCALE 1"=20'
APPROVED FOR APPROVAL	FERMCO DRU APPROVAL	000031	



DU-4/PO161 40200 485 1.1.1.4.3 00-90701 SK-G-04303 G0003 A

Figure 5-5 - Site Layout and Grading, Option 3

## SECTION 6

### DETAILED RIGGING PLAN

The selected rigging subcontractor shall submit a detailed Rigging Plan for transportation and erection of the silo superstructures for approval and site preparation planning. The plan will describe the proposed method of erection of the superstructure towers and trusses in accordance with the *DOE Hoisting and Rigging Manual* (DOE/ID-10500, April 1993) and the *FEMP Supplement to the DOE Hoisting and Rigging Manual* (RM-0030, May 1995). The plan will include drawings illustrating the proposed lifting arrangements. As a minimum, the plan shall include the following information:

- 1) Method of transport of superstructure modules and crane, including transportation routes and bridge clearances.
- 2) Listing of all interferences on site which require relocation or removal
- 3) Required location of structures at initial lift (staging/assembly area)
- 4) Type of crane(s) and lifting equipment to be used
- 5) Relative clearances to equipment and crane and other obstructions during lifts
- 6) Plot layout showing the area required to make each lift
- 7) The rigging drawing must be to scale and must include the following:
  - (1) Elevation View: The view shows the relationship between the crane(s) and equipment being lifted, and any structures that may cause interferences. It will also show clearances of less than 3 feet that may occur during any part of the lift. In some cases, a boom cross-section at the critical elevation will be needed to show the actual clearance. Show anything that is needed to completely describe the lift.
  - (2) Plan View: This view will show dimensions of the center line of rotation of all lifting cranes with the equipment in the initial pick location and in the final set location. Also show any walking or swinging required during the lift.
  - (3) Detail Rigging Hookup: Show all lifting equipment (spreaders, slings, shackles, etc.) to scale. Label rigging equipment so that it may be easily identified in the field.

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- 8) **Other data that is required:**
- (1) **Superstructure trusses**
    - a) Location of center of gravity (CG)
    - b) Location of lifting lugs
    - c) Weight in short tons (s.t. - 2,000 pounds)
  - (2) **Cranes**
    - a) Manufacturer
    - b) Model
    - c) Boom type
    - d) Type of boom point
    - e) Number of parts of load line
    - f) Total lifted weight at the boom point
    - g) Operating radius and corresponding lifting capacity
    - h) Two-block distance
  - (3) **Wire Rope Slings**
    - a) Diameter and length (bearing point to bearing point)
    - b) Breaking strength
    - c) Number of parts
    - d) Safety factor calculation
    - e) Type of hook-up
  - (4) **Spreaders**
    - a) Type
    - b) Capacity in short tons
    - c) Spread distance
  - (5) **Shackles**
    - a) Pin size
    - b) Safe working load
    - c) Manufacturer
  - (6) **Testing and Inspection Records**
    - a) Inspection and maintenance records on cranes and rigging equipment
    - b) Schedule of program showing inspection of slings
    - c) Counterfeit bolt inspection records
    - b) Weld inspection records and results of any non-destructive testing performed on rigging devices

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**Operable Unit 4  
Silo Superstructure Design  
for the Silos Project**

**Specifications**

**Operable Unit 4  
Project Order 161  
WBS No. 1.1.1.1.4.3.2  
September 1996  
Revision C, Final**

**FERMCO Project No.: 40200**

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



**25 Merchant Street  
Cincinnati, Ohio 45246**

**FOR  
INFORMATION  
ONLY**

**Operable Unit 4  
Silo Superstructure Design  
for the Silos Project**

**Specifications**

**Operable Unit 4  
Project Order 161  
WBS No. 1.1.1.1.4.3.2  
September 1996  
Revision C, Final**

**FERMCO Project No.: 40200**

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



**25 Merchant Street  
Cincinnati, Ohio 45246**

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## U.S DEPARTMENT OF ENERGY

## FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No: 40200

OPERABLE UNIT 4  
SILO SUPERSTRUCTURE DESIGN  
FOR THE SILOS PROJECT

## SPECIFICATIONS

PARSONS

Approved by:

\_\_\_\_\_  
T. Pyrz, Silos Project Manager

Date

Date: 09/13/96  
Rev.: C RE: PF00002  
1 of 1WBS No.: 1.1.1.1.4.3.2  
SILOS/40200/161

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## U.S. DEPARTMENT OF ENERGY

## FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO SUBCONTRACT NO. 2-21487

Project No: 40200

PROJECT ORDER 161

WBS NO. 1.1.1.1.4.3.2

## SPECIFICATIONS

SECTION 00003

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00003	TABLE OF CONTENTS	C	09/13/96
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01011	SUBMITTALS	C	09/13/96
01012	SCHEDULE OF DRAWINGS	C	09/13/96
<b>DIVISION 2 - SITE WORK</b>			
02110	SITE CLEARING	C	09/13/96
02200	EARTHWORK	C	09/13/96
02270	EROSION CONTROL	C	09/13/96
02725	SITE DRAINAGE	C	09/13/96
02851	STEEL GUARD RAIL	C	09/13/96
02922	SOIL PREPARATION AND SEEDING	C	09/13/96
<b>DIVISION 3 - CONCRETE</b>			
03001	CONCRETE	C	09/13/96

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05500	METAL FABRICATIONS	C	09/13/96
DIVISION 6 (NOT USED)			
DIVISION 7 - THERMAL AND MOISTURE PROTECTION			
07466	PREFORMED METAL SIDING AND ROOFING	C	09/13/96
07900	JOINT SEALERS	C	09/13/96
DIVISION 8 - DOORS AND WINDOWS			
08110	STEEL DOORS AND FRAMES	C	09/13/96
08710	DOOR HARDWARE	C	09/13/96
08800	GLAZING	C	09/13/96
DIVISION 9 - FINISHES			
09900	PAINTING	C	09/13/96
DIVISION 10 - SPECIALTIES			
10211	METAL WALL LOUVERS	C	09/13/96
DIVISIONS 11 - 16 - (NOT USED)			

END OF SECTION

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U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4

SILO SUPERSTRUCTURE DESIGN

FOR THE SILOS PROJECT

Division 01 - General Requirements

PARSONS

Prepared by: \_\_\_\_\_

\_\_\_\_\_ Date

Checked by: \_\_\_\_\_

\_\_\_\_\_ Date

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SECTION 01010  
GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SCOPE

- A. These general requirements form a part of the technical divisions of these specifications.
- B. 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.
- C. 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).
- D. In all cases where the term "Subcontractor" appears in these specifications, it shall be understood to refer to the Construction Contractor or Subcontractor.
- E. In all cases where the words "Owner's Agent" or "Construction Manager" appear, they shall be understood to refer to FERMCO.
- F. All work shall be accomplished in accordance with the following code requirements:
1. Ohio Basic Building Code (OBBC) 1995.
  2. Uniform Building Code (UBC) 1994.
  3. Code for Safety to Life from Fire in Buildings and Structures (NFPA 101, Life Safety Code) - 1994.
  4. All other National Fire Protection Association (NFPA) Codes - All inclusive, including 1996 revisions.

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5. Occupational Safety and Health Administration (OSHA) - 29 CFR 1910 and 29 CFR 1926. 29 CFR 1926 establishes the requirements for construction operations.

**1.2 SITE AND SCOPE**

A. The intent of these specifications is to provide all technical information required and necessary to perform and complete the work as required by the Contract.

B. Environmental Requirements

1. Plant Condition:

- a. Location: Fernald, Ohio.
- b. Elevation: 578 feet above sea level.
- c. Ambient Temperature: -10 to 110 degrees F.
- d. Barometric Pressure: 29.31 inches Hg. absolute (mean at 70 degrees F).
- e. Relative humidity: 20 to 90 percent.

**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, except where specifically precluded by 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. Section 01011 has the submittal listing. Refer to Part 6, Statement of Work, and Part 7, Technical Drawings and Specifications, in the Invitation for Bid for other

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submittal requirements. Any submittals not in conformance with these requirements will be returned without review for correction and resubmittal.

#### 1.5 REFERENCED PUBLICATIONS

- A. The publications listed in the technical specifications form part of this specification. Each publication shall be the latest revision and addendum in effect at the time of issue of contract and of issue of the specification unless notified otherwise. Except as modified herein or the details of the drawings, work included in this specification shall conform to the applicable provisions of these publications.

#### 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.

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 A/E Subcontractor 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) |

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- 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

1.7 **ABBREVIATIONS FOR REFERENCED STANDARDS AND SPECIFICATIONS**

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

<u>Abbreviation</u>	<u>Authority</u>
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

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<u>Abbreviation</u>	<u>Authority</u>
APA	American Plywood Association
API	American Petroleum Institute
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
NEC	National Electrical Code
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

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Abbreviation

Authority

PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
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.

END OF SECTION

SECTION 01011  
SUBMITTALS

- A. Submittal Requirements: Submittals required include drawings and/or data for all items listed below:
1. "AA" designates that these items are special requirements which are described in the technical sections of the specs.
  2. "BB" designates that shop drawings are required.
  3. "CC" designates that catalog cuts are required.
  4. "DD" designates that Material Certificates are required.
  5. "EE" designates that Certificates of Conformance are required.
  6. "FF" designates that engineering calculations are required.
  7. "GG" designates that spare parts list is required.
  8. "HH" designates that an installation, operation, and maintenance manuals (IOM) are required.
  9. "II" indicates that manufacturer's material safety data sheets (MSDS) are required.
  10. "JJ" indicates that wiring diagrams for power, signal, and control wiring are required.
  11. "KK" indicates that tests, which are to be witnessed by FERMCO, are required.
  12. "LL" - blank.
  13. "MM" samples.
  14. "NN" blank.
- B. See attached sheets for Submittals.

END OF SECTION

Section 01011 of Specifications  
Submittal Listing  
Division 2

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng'g Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	LL	Sample MM	NN
Section 02200 - Earthwork														
Fill Material	X			X										
Compaction Test	X										X			
As-Built Drawings	X				X									
Dewatering Plan	X													
Section 02270 - Erosion Control			X		X									
Section 02725 - Site Drainage			X		X									
Section 02851 - Steel Guard Rail					X									
Section 02922 - Soil Preparation and Seeding														
Maintenance Data			X											
Seed Certification	X			X										
Mulch				X										

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**Section 01011 of Specifications**  
**Submittal Listing**  
**Division 3**

Material/Equipment/Item/Description	Special Reqts AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng'g Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	LL	Sample MM	Tests Witnessed Diagram NN
Section 03001 - Concrete														
Concrete Supplier	X													
Test Reports	X										X			
Product Data	X		X											
Concrete		X			X				X					

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Section 01011 of Specifications  
 Submittal Listing  
 Division 5

Material/Equipment/Item/Description	Special Reqs AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng'g Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	LL	Sample MM	NN
Section 05120 - Structural Steel														
Structural Steel	X	X			X	X			X					
Welder's Qualifications	X													
Rigging and Assembly Plan	X													
Section 05500 - Metal Fabrication														
Fabricated Metal	X	X			X	X			X					
Welder Qualifications	X													

00004





**Section 01011 of Specifications**  
**Submittal Listing**  
**Division 9**

Material/Equipment/Item/Description	Special Reqs AA	Shop Dwgs BB	Catalog Cuts CC	Material Certif DD	Certif Conform EE	Eng'g Calcs FF	Spare Parts GG	IOM Manual HH	MSDS II	Wiring Diagram JJ	Witness Tests KK	LL	Sample MM	NN
Section 09900 - Painting														
Structural Steel and Supports			X	X					X					
Doors and Frames			X	X					X					

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SECTION 01012  
SCHEDULE OF DRAWINGS

1.1 DRAWINGS

A. Procurement and construction of the silo superstructures, equipment rooms, and equipment enclosures will be conducted through multiple contracts. The following drawings constitute the overall design and will be made part of individual contracts, as appropriate.

<u>Drawing Number</u>	<u>Drawing Title</u>
1)	94X-5900-X-00967 Project Title Sheet
2)	94X-5900-X-00968 Drawing Index
3)	94X-5900-X-00969 Legend and Symbols
4)	94X-5900-G-00970 Civil - Site/Utility Plan
5)	94X-5900-G-00971 Civil - Grading Plan
6)	94X-5900-G-00973 Civil - Details - Sheet 1 of 2
7)	94X-5900-G-00974 Civil - Details - Sheet 2 of 2
8)	94X-5900-G-00975 Civil - Utility Profile
9)	94X-5900-A-00976 Architectural - Plans and Interior Elevation - Silo 1 and 2 Equipment Room
10)	94X-5900-A-00992 Architectural - Elevations - Silo 1 and 2 Equipment Room
11)	94X-5900-A-00977 Architectural - Sections and Details - Silo 1 and 2 Equipment Room
12)	94X-5900-A-00978 Architectural - Schedules and Details - Silo 1 and 2 Equipment Room
13)	94X-5900-S-00979 Structural - Key Plan - Silo 1 and 2 Superstructure
14)	94X-5900-S-00980 Structural - Enlarged Plan - Silo 1 and 2 Top Chord
15)	94X-5900-S-00981 Structural - Enlarged Plan - Silo 1 and 2 Bottom Chord
16)	94X-5900-S-00982 Structural - Enlarged Plan - Silo 1 and 2 Equipment Room
17)	94X-5900-S-00983 Structural - Enlarged Plan - Silo 1 and 2 Equipment Room

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<u>Drawing Number</u>	<u>Drawing Title</u>
18)	94X-5900-S-00984 Structural - Plan and Details - Silo 1 and 2 Dome Segment Removal
19)	94X-5900-S-00985 Structural - Elevation - Silo 1 and 2 Truss
20)	94X-5900-S-00986 Structural - Elevations - Silo 1 and 2 Towers and Equipment Room
21)	94X-5900-S-00987 Structural - Sections and Details - Silo 1 and 2
22)	94X-5900-S-00988 Structural - Sections and Details - Silo 1 and 2
23)	94X-5900-S-01024 Structural - Sections and Details - Silo 1 and 2 Superstructure
24)	94X-5900-S-01025 Structural - Sections and Details - Silo 1 and Silo 2 Superstructure
25)	94X-5900-S-01027 Structural - Sections and Details - Silo 1 and Silo 2 Superstructure
26)	94X-5900-S-00989 Structural - Plans, Sections, and Details - Silo 1 and 2 Stairs
27)	94X-5900-S-00990 Structural - Elevations and Details - Silo 1 and 2 Ladders
28)	94X-5900-S-00991 Structural - Plan and Sections - Silo 1 and 2 Concrete Foundation
29)	94X-5900-S-01009 Structural - Truss Force Diagram - Silos 1 and 2
30)	94X-5900-S-00994 Structural - Plans - Silo 3 Equipment Enclosure
31)	94X-5900-S-00995 Structural - Elevations - Silo 3 Equipment Enclosure
32)	94X-5900-S-00996 Structural - Sections and Details - Silo 3 Equipment Enclosure
33)	94X-5900-S-00997 Structural - Plan, Section, and Details - Silo 3 Equipment Enclosure Concrete Foundation
34)	94X-5900-S-01007 Structural - Sections and Details - Silo 3 Equipment Enclosure

END OF SECTION

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U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4

SILO SUPERSTRUCTURE DESIGN

FOR THE SILOS PROJECT

Division 02 - Site Work

PARSONS

Prepared by:

\_\_\_\_\_

Date

Checked by:

\_\_\_\_\_

Date

SECTION 02110  
SITE CLEARING

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Removal of surface debris.
- B. Clearing of site plant life and grass, where it affects construction only.
- C. Removal of fencing.
- D. Removal of only designated underground and aboveground utilities.
- E. Topsoil excavation.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 02200 - Earthwork.
- D. Section 02270 - Erosion Control.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**PART 2 PRODUCTS**

Not used.

**PART 3 EXECUTION**

**3.1 PREPARATION**

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

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- B. Verify that existing utilities have been properly drained and isolated (valve turned closed and locked) prior to commencement of work. FERMCO is to properly isolate and drain utilities (to empty pipe) that are to be abandoned.
- C. Where possible, prior to any site clearing activities, all erosion control measures (silt fences, straw bales, etc.) are to be in place.

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. Clear undergrowth and dead wood without disturbing subsoil.
3. 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 necessary for construction, as directed by FERMCO. Stockpile fence in a tied roll, and stack posts in a neat pile at location on site determined by FERMCO.
3. All excess debris, waste generated, surplus soil, and contaminated material encountered as a result of the work shall be containerized or stockpiled by the Subcontractor as described in Part 6, Statement of Work, of the Invitation for Bid.

C. Utilities:

1. All utilities identified on plans are to be removed. This is to include all excavation, line removal including valves, and backfill.
2. At the end of all utility lines removed, the pipe remaining is to be properly end plugged with similar pipe materials in accordance with details shown in drawings.
3. Excavation is to be backfilled and compacted to grade in accordance with Section 02200. Soil

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materials from other excavations may be used, if suitable (as per Section 02200).

D. Topsoil Excavation:

1. Excavate topsoil separately from areas to be graded.
2. Stockpile in area designated on site to a height not exceeding 8 feet. Protect and cover from erosion. Remove excess topsoil, not re-used from the stockpile, to a site designated by FERMC0.

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 for installation of foundations and equipment.
- B. Excavating trenches for utilities.
- C. Compacted fill from top of utility bedding to subgrade elevations.
- D. Testing of compaction.
- E. Site restoration.
- F. Backfilling and compaction.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 02110 - Site Clearing.
- D. Section 02270 - Erosion Control.
- E. Section 02510 - Asphaltic Concrete Paving.
- F. Section 02725 - Site Drainage.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

1.4

REFERENCES

- A. State of Ohio, Department of Transportation (ODOT):
  - 1. Construction and Material Specifications, January 1, 1995. 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.
  
- B. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. AASHTO M43-88 Standard Specification for Sizes of Aggregate for Road and Bridge Construction (ASTM D448).
  
- C. American Society for Testing and Materials (ASTM):
  - 1. ASTM C136-95 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates (AASHTO T27).
  - 2. ASTM D422-63 Standard Test Method for Particle-Size Analysis of Soils (R 1990).
  - 3. ASTM D698-91 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft [600 kN-m/m]).
  - 4. ASTM D1556-90 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method (AASHTO T191).
  - 5. ASTM D2487-93 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 Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth) (R 1993) (AASHTO T239).
8. ASTM D4318-93 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

- D. Occupational Safety and Health Administration, Labor, Code of Federal Regulations (CFR):
1. 29 CFR 1926.650, Subpart P - Excavations.

### 1.5 SYSTEM DESCRIPTION

- A. This section involves work which requires earthwork, excavation, hauling, stockpiling, backfilling, and compaction relating to the site work involving excavation of existing slopes, and work for foundations or utilities.
- B. Definitions
1. Utility: Any buried pipe, conduit, or cable.

### 1.6 SUBMITTALS

- A. Provide submittals per Section 01011.
- B. Materials Source: Submit name of imported materials suppliers. Change of source requires FERMCO's approval.
- C. Accurately record actual locations of utilities (i.e., buried pipe, conduit, or cable) remaining, by horizontal dimensions, elevations or inverts, and slope gradients.
- D. Submit name and address of soil testing laboratory for approval. FERMCO reserves the right to qualify laboratory in accordance with site QA requirements. Provide FERMCO with copies of all lab/field soil tests performed by soil testing laboratory.

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- E. Dewatering and cover plans and details shall be submitted to and approved by FERMCO prior to dewatering and cover activities. Plans shall include methods of water collection and diversion, points of discharge, and how contaminated areas will be protected and covered at end of day's work or during inclement weather for denuded slopes and excavations.
- F. Excavation plan detailing procedures for performing excavations at Silos 1, 2, and 3. Plan is to include list of equipment to be used and how final cover will be applied and when. Plans and details are to be approved by FERMCO prior to commencement of work.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Every effort shall be made to re-use suitable surplus materials generated by project before importing materials from off site.
- B. Fill Materials
  - 1. ODOT Item 703 - Aggregate: Crushed stone; shall conform to AASHTO M43, size number 57, and within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
1-1/2 inches	100
1 inch	95 to 100
1/2 inch	25 to 60
No. 4	0 to 10
No. 8	0 to 5

- 2. ODOT Item 703 - Aggregate: Crushed stone; shall conform to AASHTO M43 size number 8, and within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
1/2 inch	100
3/8 inch	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

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3. Aggregate materials shall meet the requirements of ODOT Item 304.

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

<u>Sieve</u>	<u>Percent Passing</u>
2 inches	100
1 inch	70 to 100
3/4 inch	50 to 90
No. 4	30 to 60
No. 30	7 to 30
No. 200	0 to 13

4. 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, excluding OL, MH, OH, and FT soils.
5. Subsoil Type S2: Imported material, graded, free of lumps larger than 3 inches, rocks larger than 2 inches, and debris; conforming to ASTM D2487, excluding OL, MH, OH, and FT soils.
6. 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:

<u>Sieve Size</u>	<u>Percent Passing</u>
No. 4	90 to 100
No. 50	7 to 40
No. 200	0 to 10

- C. Potable Water: Clean, uncontaminated, fresh, and free of debris.

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- D. Topsoil: 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. When feasible, topsoil shall be salvaged from the work area and stockpiled for re-use.

**PART 3 EXECUTION**

**3.1 SITE CONDITIONS**

- A. All sediment and erosion control measures shall be in place prior to commencement of work.

**3.2 EXECUTION/INSTALLATION/APPLICATION**

- A. Subcontractor shall verify that the existing utilities are as shown on drawings, and resolve any differences or conflicts with proposed work prior to excavating.
- B. If tests indicate materials do not meet specified requirements, document variance, propose alternate materials or resolution and submit to FERMC0 for concurrence.
- C. Unless noted otherwise, all work shall be done in accordance with ODOT Section 200.
- D. Identify and mark required lines, levels, contours, and datum. Identify and mark location and elevation of existing utilities prior to construction or fabrication of materials.
- E. Excavation of soils at silos is to be performed by methods and equipment that minimize personnel contact with soils and the silos. Earthmoving equipment is not to contact the concrete silos. 2H:1V slopes or less are to be maintained throughout excavation. Standing water in excavations is not permitted.
- F. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with Fill Type S1 or S2 materials and compact to density equal to or greater than

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requirements for subsequent backfill material. The Subcontractor shall notify FERMCO of unusual or unsuitable soil conditions when they are encountered.

- G. All stockpile perimeters shall be protected with proper stormwater, erosion, and silt migration protection as per ODOT Items 207 and 670 specifications.
- H. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard, measured by volume. Inform FERMCO if rock over 1/3 cubic yard is encountered.
- I. Correct areas overexcavated with Fill Type S1 or S2 material and compact to density equal to or greater than requirements for subsequent backfill material.
- J. Verify and document that survey benchmark and intended elevations for the work are as indicated. FERMCO is to provide survey benchmark for control of work.
- K. Filling and Backfilling
  - 1. Backfill areas to contours and elevations shown. Backfill trenches to final elevations. Use unfrozen and unsaturated materials.
  - 2. Granular Fill Type A3: Place and compact materials in continuous layers not exceeding 8 inches loose lift.
  - 3. Soil Fill Type S1 or S2: Place and compact material in continuous layers not exceeding 8 inches loose lift.
  - 4. Maintain optimum moisture content (within  $\pm 3$  percent) of fill materials as determined by ASTM 3017 to attain required compaction density of 95 percent of maximum dry density as determined by ASTM D698 (Standard Proctor density).
  - 5. Backfill systematically as early as possible to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy/unsuitable subgrade surfaces.
  - 6. Unsatisfactory substrate:
    - a. Where unsatisfactory subsurface conditions (whether existing or in area of backfill) are

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- observed, excavate unsatisfactory material to satisfactory substrate as approved by FERMCO.
- b. Backfill with fill material required for specific area. Compact to density required for the area.
7. Employ a placement method so as not to disturb or damage foundations or utilities in trenches.
- L. Dust Control: Provide dust control using potable water.
- M. Dewatering:
- 1. Dewatering shall be achieved by gravity or by pumps. All methods shall be of sufficient capacity to keep excavations/trenches sufficiently dewatered. Method and point of discharge requires FERMCO approval.
- N. Topsoil Excavation:
- 1. Excavate topsoil and stockpile clean topsoil in the area designated by FERMCO.
  - 2. Protect stockpile from erosion. Refer to Section 02270 for erosion control measures.
- O. Trenching:
- 1. Cut trenches sufficiently wide to enable installation of utilities and allow inspection in accordance with 29 CFR 1962.650, Subpart P.
  - 2. Hand-trim bottom of 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.
- P. 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 a 4 inches of compacted topsoil (except at 2H:1V excavated slopes at Silos 1 and 2) on all such areas prior to final acceptance of the project by FERMCO.

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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 remaining stockpile area and site clean, raked, and with positive drainage, ready to be seeded.

Q. Material Stockpiles:

1. Stockpile materials on site at a location designated by FERMC0.
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.

### 3.3 QUALITY CONTROL

A. Laboratory Tests: The following laboratory tests shall be completed for each sample of soil materials of each type of soil to be used for fill with documented results maintained by the Subcontractor. A sample shall be obtained each time a change in appearance of the fill material is noted by FERMC0.

1. Grain-size analysis in accordance with ASTM D422.
2. Moisture-density relations of soils in accordance with ASTM D698.
3. Liquid-limit, plastic-limit, and plasticity-index in accordance with ASTM D4318.

B. Frequency of Tests:

1. Frequency of in-place density testing performed in accordance with ASTM D1556, ASTM D2922, or ASTM D3017 shall be whichever of the following requires the greatest number of tests.
  - a. Once each day of work of filling and backfilling.

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- b. Once every layer of fill.
  - c. Once every 100 cubic yards of fill.
  - d. Every 1,000 square feet under footers.
- C. If test results indicate that work does not meet specified requirements, the subcontractor shall remove work or recompact and retest. Subcontractor shall maintain documented test results and evidence of rework.
- D. The Subcontractor shall notify FERMCO of testing/inspection activities to allow for oversight at option of FERMCO prior to the start of all tests or inspections.
- E. Tolerances
- 1. Grading and Filling:  $\pm 1$  inch of indicated finish subgrade.

END OF SECTION



**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. 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.
- B. String: Jute twine.
- C. Stakes: Stakes shall be a minimum of 5 feet, 0 inches in height and 3 inches by 3/4-inches or more in width.
- D. Sediment Fence: Similar to Mirafi prefabricated silt fence with pockets and a 3/4-inch wide, high-strength industrial belt laced through a heavily reinforced top edge.
- E. Erosion Control Blankets: Similar to North American Green Straw/Coconut Type SC150, .35 lbs/yd<sup>2</sup> of straw, 0.15 lbs/yd<sup>2</sup> of coconut. Net shall be heavyweight UV stabilized top and lightweight bottom. Thread shall be cotton, biodegradable.

**PART 3 EXECUTION**

**3.1 EXECUTION/INSTALLATION/APPLICATION**

- A. Subcontractor shall inspect sediment control measures weekly and after each rain exceeding 0.25 inches to evaluate the effectiveness of the control measures. Documented records of inspections are to be maintained in the Subcontractor's site office.
- B. Protective Measures
  - 1. Construct protective devices as specified herein, and as required on the Contract Drawings.
  - 2. Sediment Fence: Conform to requirements on the construction drawings and manufacturer's recommendations, where applicable.

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C. Erosion Control Blankets

1. Install in strict accordance with manufacturer's recommendations.

**END OF SECTION**

SECTION 02725  
SITE DRAINAGE

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. High-density polyethylene (HDPE) pipe (including perforated pipe) and fittings.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.  
B. Section 01011 - Submittals.  
C. Section 02110 - Site Clearing.  
D. Section 02200 - Earthwork.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
1. ASTM D2321-89 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
  2. ASTM D2412-93 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
  3. ASTM F667-95 Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

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**1.5 SYSTEM DESCRIPTION**

- A. This section involves work which requires supplying and installing HDPE drainage piping complete with all fittings and accessories.

**1.6 SUBMITTALS**

- A. Provide submittals as required by Section 01011.

**PART 2 PRODUCTS**

**2.1 FABRICATION**

- A. Pipe and Fittings
1. Requirements for test methods, dimensions, and markings are per ASTM F667. Minimum parallel pipe stiffness values at 5 percent deflection shall be 50 psi per ASTM D2412.
  2. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.
  3. Smooth interior wall and corrugated exterior HDPE pipe shall be made of polyethylene compounds which meet or exceed the requirements of Type III, Category 4 or 5, Grade P33 or P34, Class C, per ASTM F667. Product equal to Advanced Drainage Systems, Inc., Columbus, Ohio, N-12HDPE pipe.
  4. Inlet grate shall be equal to Advance Drainage Systems, Inc., Columbus, Ohio, 10-inch inline drain.
  5. All fittings shall have neoprene gaskets and shall be thermomolded polyvinyl chloride (PVC). Fittings supplied by manufacturers other than the pipe manufacturer shall not be permitted without FERMCO's written approval.

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Hand trim excavation bottom. Correct over-excavation according to the requirements of Section 02200.

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**3.2 ERECTION/INSTALLATION/APPLICATION**

- A. Excavation and backfill in accordance with Section 02200.
  
- B. Installation of HDPE Pipe and Fittings
  - 1. Installation shall be in accordance with ASTM D2321.
  - 2. The pipe shall be laid on grade on 4-inch Type A3 bedding material.
  - 3. The pipe shall be cut, when necessary, in the corrugation valley only.
  - 4. Gaskets shall be placed in the first full corrugation valley, and oriented so that the white striped side faces the joint.
  - 5. With gaskets in place, use pipe lubricant liberally on the gasket and fitting bell.
  - 6. Push pipe into fitting or bell. Apply pressure evenly during insertion.
  
- C. Perforated Pipe
  - 1. Install perforated pipe as shown on the drawings with perforations toward bottom of trench per manufacturer's recommendations.

**3.3 PROTECTION**

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

**3.4 TOLERANCES**

- A. Install pipe to indicated elevations at structures to within a tolerance of 5/8 inch.

**END OF SECTION**

SECTION 02851  
STEEL GUARD RAIL

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Supply and installation of steel guardrail and steel posts.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.  
B. Section 01011 - Submittals.  
C. Section 02200 - Earthwork.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

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

**1.5 SYSTEM DESCRIPTION**

- A. This work shall consist of the construction of guardrail and guard posts in accordance with these specifications and conformity with the lines and grades shown on the plans.

**1.6 SUBMITTALS**

- A. Submittals shall be in accordance with Section 01011.

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**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Guardrail shall be deep beam rail, type 4, single face. Steel posts, rails, bolts, fittings, and other accessories shall be galvanized. Specific materials shall be as follows:

<u>Subject</u>	<u>ODOT Item No.</u>
Deep beam rail and hardware	710.06
Galvanizing	711.02
Steel guardrail posts	710.15

**PART 3 EXECUTION**

**3.2 ERECTION/INSTALLATION/APPLICATION**

- A. Perform work in accordance with ODOT Standard Specifications, except as modified specifically otherwise herein.
1. Maintain a copy of the ODOT Standard Specifications in the field office of the Contractor for use by FERMCO, as well as by the Contractor and the Contractor's employees. Do not remove from the field office.
- B. Guardrail shall be installed in accordance with ODOT Item 606.
- C. Guardrail shall be constructed with flared end section at each end.

**END OF SECTION**

SECTION 02922  
SOIL PREPARATION AND SEEDING

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Preparation of the soil surface prior to the application of soil treatment materials.
- B. Furnishing all materials, labor, equipment, and services required to apply soil treatment materials, seed, and mulch.
- C. Controlling fugitive dust during soil preparation.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 02200 - Earthwork.
- D. Section 02270 - Erosion Control.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. State of Ohio, Department of Transportation (ODOT):
  - 1. Construction and Material Specifications, January 1, 1993 (ODOT). 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.

**1.5 SUBMITTALS**

- A. Provide submittals as required by Section 01011.

**1.6 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 percentages of each seed variety.
  2. Year of production, percentage of purity, and minimum germination rate. Date of packaging.
  3. Net weight.
- B. Deliver plant nutrients and soil conditioners in waterproof bags showing weight, chemical analysis, name of manufacturer, and Material Safety Data Sheet (MSDS).

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Seed
1. Varieties of grass involved in the work of this section shall be as scheduled in Article 3.3, Paragraph B.
  2. Seed shall be clean, guaranteed 95 percent pure, and have a minimum germination rate of 85 percent within 1 year of test.
- B. Soil Materials
1. As specified in Section 02200.
- 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 specified in Article 3.3, Paragraph A. Another analysis, in the same ratio, 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 of not less than 2 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 be injurious to desired plant growth.

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

**PART 3 EXECUTION**

**3.1 EXAMINATION**

**A. Protective Measures**

Erosion control measures shall be in place and properly maintained (see specification Section 02270).

**3.2 SITE CONDITIONS**

**A. Preparation of Subsoil**

1. 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.
2. Remove debris, weeds, and undesirable plants and their roots. Manage materials in accordance with the Subcontract, Part 6, Statement of Work. FERMCO to assess and provide authorization prior to removal.
3. Prepare seed bed in accordance with specification Section 02200.

### 3.3 ERECTION/INSTALLATION/APPLICATION

#### A. Application of Plant Nutrients

1. Apply fertilizer at the rate of not less than 100 lbs per acre of actual nitrogen, 50 lbs per acre of actual phosphorous, and 150 lbs per acre of actual potassium (or 1000 pounds per acre of 12-6-18).
2. Apply after smooth raking of topsoil and prior to roller compaction.
3. Mix thoroughly into upper 3 inches of topsoil.
4. Lightly water to aid the distribution of fertilizer.

#### B. Seeding

1. When applying seed with a mechanical spreader, apply at a rate of 1-1/2 pounds per 1,000 square feet (65 pounds per acre) evenly in two intersecting directions. Rake in lightly.
2. Do not seed areas in excess of that which can be mulched on same day.
3. Apply seed mixture as follows:
  - a. Permanent seeding:
    - 1) 40 percent Kentucky Bluegrass.
    - 2) 40 percent Creeping Red Fescue.
    - 3) 20 percent Annual Ryegrass.
  - b. All seeding performed between October 15 and March 15 shall be temporary seeding in accordance with ODOT Item 207 and permanent seeding as specified above shall be performed between March 15 and October 15.
4. Lightly roll seeded area.
5. Immediately following seeding and compacting, apply mulch.
6. Apply water with a fine spray immediately after each area has been mulched. Saturate soil to approximately 4 inches deep, at a rate of 120 gallons per 1,000 square feet.

#### C. Seed Protection

1. Protection:
  - a. Apply protection as necessary to retain soil and plant material.

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- b. Cover seeded area with mulch.
  - 2. 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.
  - 3. Asphalt Emulsion:
    - a. Apply by spraying evenly over mulched areas at a rate of 60 gallons per ton of mulch.
- D. The Subcontractor shall notify FERMCO prior to anticipated inspection.
- 1. To qualify for acceptance, an area shall have a good, clean stand of perennial grass. Coverage shall be at least 95 percent of the area, and no bare spot shall exceed 3 square feet.
  - 2. Areas which fail to meet requirements of the Contract Documents shall be repaired or re-seeded as necessary to produce an acceptable stand of grass.

END OF SECTION

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4  
SILO SUPERSTRUCTURE DESIGN  
FOR THE SILOS PROJECT

Division 03 - Concrete

PARSONS

Prepared by:

\_\_\_\_\_

Date

Checked by:

\_\_\_\_\_

Date

Date: 09/13/96 \_\_\_  
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SECTION 03001  
CONCRETE

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Concrete work for foundations, slabs, walls, equipment supports, and other miscellaneous concrete.
- B. Formwork and accessories.
- C. Reinforcement and accessories.
- D. Cast-in-place concrete, grout, and accessories.
- E. Finishing and curing.
- F. Sampling and testing of concrete work.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 02200 - Earthwork.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. American Concrete Institute (ACI):
  - 1. ACI 301-89 Specifications for Structural Concrete for Buildings.
  - 2. ACI 305R-91 Hot Weather Concreting.
  - 3. ACI 306R-88 Cold Weather Concreting.

4. ACI 318/318R Building Code Requirements for  
Rev. 92 Reinforced Concrete.
5. ~~ACI 439.3R-91~~ Mechanical Connections of  
Reinforcing Bars.
6. ACI SP-66-94 ACI Detailing Manual.

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

1. ASTM A185-94 Steel Welded Wire Fabric,  
Plain, for Concrete  
Reinforcement.
2. ASTM A615/A615M Deformed and Plain Billet-  
Rev. B-95 Steel Bars for Concrete  
Reinforcement.
3. ASTM C31-91 Standard Practice for Making  
and Curing Concrete Test  
Specimens in the Field.
4. ASTM C33-93 Concrete Aggregates.
5. ASTM C39-94 Standard Test Method for  
Compressive Strength of  
Cylindrical Concrete  
Specimens.
6. ASTM C94-94 Ready Mixed Concrete.
7. ASTM C109/  
C109M-95 Standard Test Method for  
Compressive Strength of  
Hydraulic Cement Mortars.
8. ASTM C143 Standard Test Method for Slump  
Rev. A-90 of Hydraulic Cement Concrete.
9. ASTM C150-95 Portland Cement.
10. ASTM C157-93 Standard Test Method for  
Length Change of Hardened  
Hydraulic Cement Mortar and  
Concrete.
11. ASTM C231 Standard Test Method for Air  
Rev. B-91 Content of Freshly Mixed  
Concrete by the Pressure  
Method.
12. ASTM C260-95 Air-Entraining Admixtures for  
Concrete.
13. ASTM C309-95 Liquid Membrane-Forming  
Compounds for Curing Concrete.

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14. ASTM C311  
Rev. B-94 Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.
15. ASTM C494-92 Chemical Admixtures for Concrete.
16. ASTM C618-95 Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
17. ASTM C827  
Rev. A-95 Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
18. ASTM C882-91 Standard Test for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
19. ASTM C920-94 Elastomeric Joint Sealants.

C. U. S. Department Of Commerce, Voluntary Products Standards (PS):

1. PS 1-83 Plywood.

1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01011.
- B. Shop Drawings: Indicate reinforcing bar sizes, spacings, locations, quantities, bending and cutting schedules, placing drawings, and supporting and spacing devices.
- C. Product Data: Concrete mix designs, including documentation of aggregate sources and most recent sieve analysis. Sieve analyses must not be older than 1 year.
- D. Concrete Supplier: Name and address of the transit-mix concrete supplier. Supply typical batch ticket and history per ASTM C94.

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- E. Test Reports: Submit test reports for all tests required under Article 3.3.

**1.6 TECHNICAL CLARIFICATION**

- A. ACI 301: References are made to ACI 301 to abbreviate text of this section. Only those portions of ACI 301 referred to specifically in this section shall apply.
- B. Amend Subparagraph 1.3.1 of ACI 301 to change the following titles to read (wherever they occur in ACI 301):

<u>ACI 301</u>	<u>Change To Read</u>
Architect/Engineer	PARSONS
Owner	FERMCO

- C. Formwork shall be in accordance with Chapter 4 of ACI 301 unless specified otherwise in this section.
- D. Perform concrete reinforcing work in accordance with Chapter 5 of ACI 301, unless specified otherwise in this section.
- E. Perform cast-in-place concrete work in accordance with Chapters 7, 8, 10, 11, and 12 of ACI 301, unless specified otherwise in this section.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Reinforcing bars shall be delivered to meet the construction schedule and stored as directed by the Construction Manager.
- B. Tags: Reinforcing bar tags shall be made of durable material and marked in a legible manner with waterproof markings; not less than one tag per bundle, attached by wire. Identification tags shall show the grade, number of pieces, size, and mark or length of bars.

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**PART 2 PRODUCTS****2.1 MATERIALS**

- A. Plywood Forms: Not less than 5/8-inch-thick, 5-ply Douglas fir plywood conforming to PS 1, and as manufactured by a member of the American Plywood Association; B-B Plyform, Class I, Exterior-APA, with plyform faces sanded and oiled.
- B. Prefabricated Type Forms: Matched, tight fitting, stiffened to support weight of concrete.
- C. Form Release Agent: Colorless mineral oil which will not stain concrete nor impair natural bonding characteristics of subsequent coatings.
- D. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars; plain finish.
- E. Welded Steel, Wire Fabric: ASTM A185, plain-type flat sheets, plain finish.
- F. Tie Wire: Minimum 16-gage annealed type wire.
- G. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- H. Fabrication: Fabricate concrete reinforcing in accordance with ACI SP-66 and Chapter 7 and 12 of ACI 318.
- I. Cement:
  - 1. Normal, Portland cement, conforming to requirements of ASTM C150, Type I.
- J. Admixtures:
  - 1. Air Entrainment: Conforming to ASTM C260.
  - 2. Water Reducing and Retarding: Conforming to requirements of ASTM C494.

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- K. **Aggregates:**
1. Normal Weight Concrete: Conforming to requirements of ASTM C33.
  2. Maximum aggregate size: 1 inch.

2.2 **ACCESSORIES**

- A. **Chamfer Strips:** Chamfered, wood strip type; 3/4 by 3/4-inch size.
- B. **Nails, Spikes, and Anchorages:** Sized as required and of sufficient strength and character to maintain formwork in place while placing concrete.
- C. **Form Ties:** Removable or snap-off type; designed to prevent form deflection; of adjustable length, cone type, with waterproofing washer; and free of defects that could leave holes larger than 1 inch in concrete surface.
- D. **Joint Sealer:** Elastomeric joint sealant conforming to ASTM C920; Type S or Type M, Grade P, Class 25.
1. Acceptable products and suppliers (or equal):
    - a. Sikadur 51 SL, by Sika Corp.
    - b. Sonolastic SL-1, by Sonneborn Building Products.
- E. **Nonshrink Grout Under Equipment:** Premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agent; capable of developing minimum compressive strength of 7,000 psi in 28 days; conforming to ASTM C109 and ASTM C827.
1. Acceptable products and suppliers (or equal):
    - a. Masterflow 713, by Master Builders.
    - b. SikaGrout 212, by Sika Corp.
    - c. Sealtight 588, by W.R. Meadows.
- F. **Patching Grout:** Premixed, nonshrink epoxy grout, capable of developing minimum compressive strength of 3,000 psi in 24 hours, conforming to ASTM C109. The grout must not shrink or expand more than 5 percent when tested in accordance with ASTM C157 and achieve a

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minimum bond strength of 1,200 psi in 24 hours when tested in accordance with ASTM C882.

- G. Bonding Agent: Polyvinyl acetate polymer or acrylic polymer, water resistant when cured.
- H. Curing Compound: Conforming to the requirements of ASTM C309, clear; must not impair natural bonding characteristics of subsequent coatings.
- I. **Mechanical Connections of Reinforcing Bars: Conforming to requirements of ACI 439.3R, tapered-threaded steel coupler, for tension-compression mechanical connections (Reference dwg S-00991; S-0016, Section B).**

### 2.3 FABRICATION

- A. General: All concrete used in the work shall be composed of Portland cement, fine and coarse aggregate, and the specified admixtures. Design mixes shall be submitted for approval before any concrete is placed. Concrete for every part of the work shall be of homogeneous structure which, when hardened, will have the required strength and resistance to weathering. The proportions for all concrete shall be such as to produce a mixture which will work readily into the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate.

B. Mix Proportions:

1. The following mix designs shall be used for cast-in-place concrete.

a. **Slabs and Foundation as noted**

Specified Strength (28 days)	4,000 psi
Total Air Content:	5 ± 1-1/2 percent
Specified Slump:	4 inches ± 1 inch
Maximum Aggregate Size:	1 inch
Maximum Water/Cement Ratio:	0.35 (per ACI 318, Section 5.4)

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Water Reducing and retarding admixtures as required per ASTM C494.

b. Walls and Foundations ~~unless otherwise noted.~~

Specified Strength (28 days): 3,000 psi

Total Air Content: 5 ± 1-1/2 percent

Specified Slump: 4 inches ± 1 inch

Maximum Aggregate Size: 1 inch

Maximum Water/Cement Ratio: 0.46 (per ACI 318, Section 5.4)

Water Reducing and retarding admixtures as required per ASTM C494.

c. Lean Mix

Specified Strength (28 days): 2,500 psi

Specified Slump: 6 inches ± 1-1/2

Maximum Aggregate Size: 3/8 inch

Maximum Water/Cement Ratio: 0.67 (per ACI 318, Section 5-4).

2. The work has been designed for concrete having a minimum compressive strength at 28 days as determined by ASTM C39. The water/cement ratio shall be determined by consideration of the specified strength, the water reducing admixtures, the slump required for proper placement, air entraining requirements, the maximum allowable aggregate size and its specific gravity, the fineness modulus of the fine aggregate and its specific gravity, and the amount of water carried on the aggregates. The mix designs shall be proportioned in accordance with ACI 318, Section 5.3 or Section 5.4.
3. The proportions of all materials in the concrete shall be subject to review by FERMC0. The Subcontractor shall provide all plant and equipment necessary to determine and control the actual proportions of materials entering the batch. Slumps shall be recorded for each trial batch.

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- C. **Water Content:** In calculating the total water content in any mix, the amount of water carried on the aggregate shall be included. The water on the aggregate shall be determined periodically by test, and the amount of free water on the aggregate shall be subtracted from the water allowed in the mix. In all cases, the amount of water to be used shall be the minimum amount required to produce a plastic mixture of the specified strength and slump.
- D. **Mixing and Delivery:** Mixing and delivery of concrete shall be scheduled so that all concrete placing operations can be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first, after introduction of mixing water to cement and aggregates, in accordance with Section 11 of ASTM C94. When air temperature has fallen to or is expected to fall below 40 degrees F, the recommendations for cold weather concreting contained in ACI 306R shall be followed. When the air temperature exceeds 90 degrees F, the recommendations for hot weather concreting contained in ACI 305R shall be followed.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Erect formwork and bracing to achieve design requirements in accordance with requirements of Chapter 4 of ACI 301.
1. Provide bracing to ensure stability of formwork.
  2. Align joints and make watertight. Keep number of form joints to a minimum.
  3. Provide chamfer strips on external corners of permanently exposed edges.
  4. Shore or strengthen formwork subject to overstressing by construction loads.

- B. Application - Form Release Agent: Apply form release agent on formwork in accordance with manufacturer's instructions.
1. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
  2. Keep surfaces coated prior to placement of concrete.
- C. Form Cleaning: Clean and remove foreign matter within forms as erection proceeds.
1. Clean formed cavities of debris prior to placing concrete.
  2. Flush with water or use compressed air to remove remaining foreign matter.
  3. Ensure that water and debris drain to exterior.
  4. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms.
- D. Tolerances: Construct formwork to maintain tolerances required by ACI 301, Section 4.3.
- E. Form Removal: Forms or bracing shall not be removed until concrete has gained sufficient strength to carry its own weight and imposed loads.
1. Loosen forms carefully.
  2. Do not wedge with pry bars, hammers, or tools against finished concrete surfaces.
- F. Preparation for Grouting:
1. To ensure proper bond to concrete, all grease, oil, dirt, and other deleterious materials shall be completely removed.
  2. Roughen the surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the existing concrete.
  3. After concrete surfaces have been washed clean, they shall then be saturated with water for 24 hours prior to placement of cement-based grout.
  4. Upon completion of saturation period, excess water shall be removed prior to grouting.

### 3.2 ERECTION/INSTALLATION/APPLICATION

- A. Place, support, and secure reinforcement against displacement. Flame cutting of rebar is not permitted. Do not deviate from required position.
- B. Maintain concrete cover around reinforcing according to the requirements of Chapter 5 of ACI 301 and Chapter 7 of ACI 318, and as shown on construction drawings.
- C. Provide formed openings where required for work to be embedded in concrete members.
- D. Coordinate work of other sections in forming and setting openings, slots, recesses, sleeves, bolts, anchors, and other inserts.
- E. Make grounding system connections to reinforcing steel and anchor bolts as shown on the drawings.
- F. Install concrete accessories straight, level, and plumb or as called out on the construction drawings.
- G. Place concrete continuously between forms or other limits indicated on the construction drawings.
  - 1. Place concrete in accordance with Chapter 8 of ACI 301 and Chapter 5 of ACI 318.
  - 2. Ensure that reinforcement and forms are not disturbed during concrete placement.
- H. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- I. Installation of Grout:
  - 1. Follow the manufacturer's instructions for mixing, placing, and curing grout.

### 3.3 TESTING

- A. Field tests (take slumps, air, and cylinders) and laboratory tests shall be performed on specimens. Concrete testing shall be performed in accordance with

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Chapter 16 of ACI 301 for each 50 cubic yards, or fraction thereof, of each mix design placed in any 1 day.

1. Slump Tests: ASTM C143. One sample for each strength test.
2. Air Content Tests: ASTM C231. One sample for each strength test.
3. Test Cylinders: ASTM C31. One set of three cylinders for above quantities.
4. Compressive Strength: ASTM C39. One specimen tested at 7 days and two specimens tested at 28 days.

### 3.4 PROTECTION

- A. Provide concrete curing and protection in accordance with Chapter 12 of ACI 301.
  1. Apply floor slab curing compound, where used, in accordance with the approved manufacturer's recommendations.
- B. Provide finishes for formed concrete surfaces as defined in Chapter 10 of ACI 301.
- C. Provide finishes and tolerances for slabs in accordance with Chapter 11 of ACI 301.
  1. Provide troweled finish with Class A tolerance on all exposed slabs.

END OF SECTION

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4

SILO SUPERSTRUCTURE DESIGN

FOR THE SILOS PROJECT

Division 05 - Metals

PARSONS

Prepared by:

\_\_\_\_\_

Date

Checked by:

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Date

SECTION 05120  
STRUCTURAL STEEL

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Structural steel framing members, baseplates, floor plates, connection bolts, anchor bolts, welding, modular construction, and detail material required to complete the work.
- B. Grouting under baseplates.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 09900 - Painting.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. American Institute of Steel Construction (AISC):
  - 1. AISC M016-89 Manual of Steel Construction - Allowable Stress Design (ASD) (Ninth Edition).
  - 2. AISC S302-86 Code of Standard Practice for Steel Buildings and Bridges.
  - 3. AISC S329-85 Allowance Stress Design Specification for Structural Joints Using ASTM A325 or A490 Bolts - Allowable Stress Design.
  - 4. AISC S335-89 Specification for Structural Steel Buildings, Allowable

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Stress Design and Plastic  
Design (ASD).

- B. American Society for Testing and Materials (ASTM):
1. ASTM A36/A36M-94 Carbon Structural Steel.
  2. ASTM A53 Pipe, Steel, Black and Hot  
Rev. A-95 Dipped, Zinc-Coated, Welded  
and Seamless.
  3. ASTM A325-94 Structural Bolts, Steel, Heat-  
Treated, 120/105 ksi Minimum  
Tensile Strength.
  4. ASTM A490-93 Heat Treated Steel Structural,  
Bolts 150 ksi Minimum Tensile  
Strength.
  5. ASTM A500-93 Cold Formed Welded and  
Seamless Carbon Steel  
Structural Tubings in Rounds  
and Shapes.
  6. ASTM A563-94 Standard Specification for  
Carbon and Alloy Steel Nuts.
  7. ASTM A687-93 Standard Specification for  
High-Strength Nonheaded Steel  
Bolts and Studs.
  8. ASTM C109/  
C109-M-95 Standard Test Method for  
Compressive Strength of  
Hydraulic Cement Mortars.
  9. ASTM C827 Standard Test Method for  
Rev. A-95 Change in Height at Early Ages  
of Cylindrical Specimens from  
Cementitious Mixtures.
  10. ASTM F436-93 Standard Specification for  
Hardened Steel Washers.
  11. ASTM F959 Standard Specification for  
Rev. A-94 Compressible Washer-Type  
Direct Tension Indicators for  
Use with Structural Fasteners.

- C. American Welding Society, Inc. (AWS):
1. AWS A2.4-93 Standard Symbols for Welding,  
Brazing, and Nondestructive  
Examination.
  2. AWS D1.1-94 Structural Welding Code Steel.

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- D. Steel Structures Painting Council (SSPC):
1. SSPC SP 3-89 Surface Preparation Specification No. 3 - Power Tool Cleaning.
  2. SSPC SP 6-91 Surface Preparation Specification No. 6 - Commercial Blast Cleaning.
- E. American National Standards Institute (ANSI):
1. ANSI A10.13-89 Construction and Demolition Operations - Steel Erection - Safety Requirements.
  2. ANSI A14.3-92 Safety Requirements for Fixed Ladders.

### 1.5 SUBMITTALS

- A. Submittals shall be in accordance with Section 01011.
- B. Shop Drawings:
1. Indicate sizes, locations of structural members, bolted connections, and welded connections.
  2. Provide details of connections not shown on the drawings. Connections shall be designed for the full capacity of the member unless loads are indicated on the drawings.
  3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
  4. Indicate modular construction and fabrication details.
  5. The connections not detailed on the drawings are to be designed under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Ohio.
- C. Rigging and Assembly Plan
1. Steel Erector shall submit Rigging Plan. This plan will indicate that erector has visited the FEMP site, both to gain familiarization with the site and to assist in planning a transportation route. Additional rigging plan submittal

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requirements are specified in assembly and rigging concept plan.

2. Rigging Plan shall be developed under direct supervision of a professional structural engineer experienced in design of this type of work and licensed in the State of Ohio.

- D. Welders Certificates: Certify welders employed on the work, verifying AWS qualification to specified procedures within the previous 12 months, as per Section 5, Part C of AWS D1.1

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. ASTM A325 and A490 high-strength bolts shall be delivered to the site in the original labeled containers, and once on site shall not be transferred into unlabeled containers. The label information shall include the type of bolt, purchase order number, and the name of the supplier.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. Structural Steel Members: ASTM A36 and ASTM A500.
- B. Bolts, ASTM A325 and ASTM A490; Nuts, ASTM A563; and Washers, ASTM F436.
- C. Load Indicating Washers: ASTM F959.
- D. Floor Plates and Checkered Plates: ASTM A36.
- E. Anchor Bolts: ASTM A36 and ASTM A687 as noted on the drawings.
- F. Welding Materials: Conforming to AWS D1.1.
- G. Expansion Anchors: Drilled expansion bolts for securing steel to concrete.
  1. Acceptable manufacturers (or approved equal):
    - a. Kwik Bolt, by Hilti, Inc.

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- b. Parabolt, by Molly Fastener Group.
  - c. Wedge Anchors, by ITW Ramset/Red Head.
- H. Grout: Nonshrink type, pre-mixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agent, capable of developing a minimum compressive strength of 7,000 psi at 28 days; conforming to ASTM C109 and ASTM C827.
- 1. Acceptable products and suppliers (or approved equal):
    - a. Masterflow 713, by Master Builders.
    - b. SikaGrout 212, by Sika Corp.
    - c. Sealtight 588, by W.R. Meadows.
- I. Shop and Touch-Up Primer: As per Section 09900.
- J. Pipe Sleeves: ASTM A53.

## 2.2 FABRICATION

- A. Shop Fabrication Assembly:
- 1. Fabricated items of structural steel shall comply with the requirements and tolerances of the code of standard practice in the AISC Manual of Steel Construction-89 and in accordance with AISC-85 and AISC-86, and as indicated on final shop drawings.
  - 2. Properly mark and match-mark materials for field assembly.
  - 3. Members shall be free from twists, kinks, or open joints and shall be made so that when assembled, the parts shall come together without shimming.
  - 4. Open holes shall be provided for bolted connections of work specified in other sections.
  - 5. Modular construction and fabrications: The structure shall be shop fabricated in large modules as shown on design drawings.
- B. Connections:
- 1. Field connections shall be bolted, unless shown as welded on the drawings.
  - 2. Provide, as a minimum, 3/4-inch diameter, high-strength threaded fasteners for all bolted connections per ASTM A325 and A490.

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3. Beam connections shall be fabricated with double angle connection. Clips shall be shop welded to the beam and field bolted to the supporting member.
  4. All members meeting at a point shall have their gravity axis intersecting at a common work point, unless shown otherwise.
  5. Bolted connections shall have a minimum of two bolts, unless noted otherwise on the drawings.
- C. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC-85.
- D. Welded Construction: Comply with AWS D1.1 for procedure, appearance, and quality of welds; and for methods used in correcting welding work. Continuously seal joined members subject to exterior exposure by continuous welds. Grind exposed welds smooth where noted on drawings.

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Prepare structural component surfaces in accordance with SSPC SP 6.
- B. Shop and Touch-Up Primer: Per Section 09900.

**3.2 ERECTION/INSTALLATION/APPLICATION**

- A. Steel erection shall conform to the following codes, standards, and project-specific rigging plan:
  1. ANSI A10.13.
  2. AISC-86.
  3. ANSI A14.3.
  4. Rigging plan for erection of superstructure for Silos 1 and 2.
- B. Allow for erection loads. Provide temporary bracing to maintain framing in alignment until completion of erection and installation of permanent bridging and bracing. Provide temporary foundations as required for

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erection. The foundations shown on construction drawings are designed for final loads and not to be used as temporary foundations.

- C. Field-weld components indicated on construction drawings. Field welding shall be in accordance with AWS D1.1.
- D. Do not field-cut or alter structural members without FERMCO's written approval.
- E. Do not enlarge unfair holes in members by burning or by use of drift pins.
- F. Gas Cutting:
  - 1. Gas cutting will be permitted only on secondary members that are not under stress.
  - 2. Finish gas-cut sections equal to a sheared appearance.
- G. Permanent bolting or welding shall be done after structure has been properly aligned and plumbed.
- H. Field-bolt structural members with minimum 3/4-inch-diameter A325 or A490 bolts, as indicated on the drawings. Tighten high-strength bolts to the minimum tension required by AISC-85. All fasteners shall be tightened in accordance with AISC-85 using direct tension indicator tightening method.
- I. After erection and inspection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- J. Install drilled expansion anchor bolts as indicated on drawings to anchor steel framing per manufacturer's recommendations.
- K. Grout under baseplates in accordance with grout manufacturer's instructions and recommendations.
- L. Touch-up Painting: Field welds, bolted connections, abraded areas, and other areas where shop coat is

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discontinuous shall be cleaned in accordance with SSPC SP 3 and shall receive one coat of prime paint to match the shop coating system specified in Section 09900.

3.4 TESTING

- A. Subcontractor shall inspect high-strength bolted connections and welded connections, perform tests, and prepare test reports on 100 percent of high-strength, bolted connections.
- B. Interpret tests, prepare reports, state in each report whether test specimens comply with requirements, and specifically state any deviations.
- C. Testing Program:
  - 1. FERMCO may inspect structural steel at the shop before shipment; however, FERMCO reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.
  - 2. High-Strength Bolted Connections:
    - a. Inspect in accordance with AISC-85 for structural joints.
  - 3. Shop and Field Welding:
    - a. During fabrication and erection of structural steel assemblies, inspect and test all shop and field welds in accordance with AWS D1.1 and as follows:
      - 1) Conduct and document inspections and tests as required. Document types and locations of all defects found in the work. Record work required and performed to correct deficiencies.
      - 2) Perform and document visual inspection of all welds by a qualified inspector.
      - 3) Perform nondestructive tests of welds as follows:
        - a) Fillet Welds: One spot test per member. Magnetic particle testing or other methods of NDT testing, with FERMCO concurrence, shall be used.

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- 4) All welds that fail shall be rewelded and retested until passing.
- 5) Perform additional tests to reconfirm any noncompliance of the original work and as may be necessary to show compliance of corrected work. Cost of all retesting shall be borne by the Subcontractor.

D. Cooperation of Subcontractor with FERMCO:

1. Provide access for FERMCO to places where structural steel work is being fabricated or produced so that inspection and testing can be accomplished as required.
2. Subcontractor shall assist FERMCO Quality Control by providing access to all bolts and welds to be inspected.

E. Correction of Work:

1. Correct and document deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements.

**END OF SECTION**

SECTION 05500  
METAL FABRICATIONS

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Structural steel framing members, plate for siding, roofing, grating, handrails, railings, ladders, platforms, and steel stairs to complete the work.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 05120 - Structural Steel.
- D. Section 09900 - Painting.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
1. ASTM A36/A36M-94 Carbon Structural Steel.
  2. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless.  
Rev. A-95
  3. ASTM A325-94 Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  4. ASTM A500-93 Cold Formed Welded and Seamless Carbon Steel Structural Tubings in Rounds and Shapes.
  5. ASTM A569/A569M Steel, Carbon, Hot-Rolled Sheet and Strip Commercial Quality.  
Rev. A-91

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- 6.     ASTM C109/  
       C109M-95                     Standard Test Method for  
                                      Compressive Strength of  
                                      Hydraulic Cement Mortars.
- 7.     ASTM C827  
       Rev. A-95                    Standard Test Method for  
                                      Change in Height at Early Ages  
                                      of Cylindrical Specimens from  
                                      Cementitious Mixtures.
  
- B.     American Welding Society, Inc. (AWS):
  - 1.     AWS A2.4-93                 Standard Symbols for Welding,  
                                      Brazing, and Non-Destructive  
                                      Examination.
  - 2.     AWS D1.1-94                Structural Welding Code -  
                                      Steel.
  
- C.     American Institute of Steel Construction (AISC):
  - 1.     AISC M106-89                Manual of Steel Construction -  
                                      Allowable Stress Design (ASD),  
                                      Ninth Edition.
  - 2.     AISC S302-86                Code of Standard Practice for  
                                      Steel Buildings and Bridges.
  - 3.     AISC S329-85                Specifications for Structural  
                                      Joints Using ASTM A325 or A490  
                                      Bolts.
  
- D.     Steel Structures Painting Council (SSPC):
  - 1.     SSPC SP 3-89                Surface Preparation  
                                      Specification No. 3 - Power  
                                      Tool Cleaning.
  - 2.     SSPC SP 6-91                Surface Preparation  
                                      Specification No. 6 -  
                                      Commercial Blast Cleaning.
  
- E.     American National Standards Institute (ANSI):
  - 1.     ANSI A10.13-89              Construction and Demolition  
                                      Operations - Steel Erection -  
                                      Safety Requirements.
  - 2.     ANSI A14.3-92              Safety Requirements for Fixed  
                                      Ladders.

1.5     **SUBMITTALS**

- A.     Submittals shall be in accordance with Section 01011.

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- B. Shop Drawings: Indicate profiles, sizes, connection attachments, size and type of fasteners, and accessories. Include erection drawings and details.
1. Indicate field-welded procedures and connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
  2. Shop drawings must bear the stamp of a Registered Professional Engineer experienced in structural design and licensed in the State of Ohio.
- C. Welders Certificates: Certify welders employed on the work, verifying AWS qualification to specified procedures within the previous 12 months, as per Section 5, Part C of AWS D1.1.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Steel Sections: ASTM A36 and ASTM A500.
- B. Bar Grating: ASTM A569 for material 3/16-inch thick or less. ASTM A36 for material 1/4-inch thick or greater.
- C. Pipe Hand Railings: Fabricate from 1-1/2-inch nominal diameter, Schedule 40 structural steel pipe (ASTM A53, Grade B).
- D. Sheet (for Silo 3 Equipment Enclosure Siding): 10 gage, carbon steel, rolled sheet, ASTM A569.
- E. Bolts per ASTM A325, nuts per ASTM A563, and washers per ASTM F436.
- F. Anchor Bolts: ASTM A36.
- G. Expansion Anchors: Drilled expansion bolts for securing steel to concrete.
1. Acceptable products and suppliers (or equal):
    - a. Kwik Bolt, by Hilti, Inc.
    - b. Parabolt, by Molly Fastener Group.
    - c. Wedge Anchors, by ITW Ramset/Red Head.

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- H. Welding Materials: Conforming to AWS D1.1.
- I. Grout: Nonshrink type, premixed compound consisting of nonmetallic aggregate, cement, and water reducing and plasticizing agent; capable of developing a minimum compressive strength of 7,000 psi at 28 days; conforming to ASTM C109 and ASTM C827.
  - 1. Acceptable products and suppliers (or equal):
    - a. Masterflow 713, by Master Builders.
    - b. SikaGrout 212, by Sika Corp.
    - c. Sealtight 588, by W.R. Meadows.
- J. Shop and Touch-Up Paint: As per Section 09900.

2.2 FABRICATION

- A. Fabricate structural steel members in accordance with AISC-89, Code of Standard Practice for Steel Buildings and Bridges and with AISC Manual of Steel Construction (ASD).
- B. Fit and shop-assemble in largest practical sections for delivery to site.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight and flush.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish.
- E. Accurately fabricate components required for anchorage of items to each other and to existing structures.
- F. Fabricated steel members and assemblies shall comply with the requirements and tolerances of the Code of Standard Practice in the AISC Manual of Steel Construction (ASD) and Code of Standard Practice for Steel Buildings and Bridges.

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- G. Shop welding shall be in accordance with AWS D1.1.
1. Continuously seal joined members subject to exterior exposure as indicated on the drawings by continuous welds. Grind exposed welds smooth where noted on drawings.

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Prepare surfaces in accordance with SSPC SP 6.
- B. Shop and Touch-Up Primer: Per Section 09900.

**3.2 ERECTION/INSTALLATION/APPLICATION**

- A. Steel erection shall conform to the following codes and standards:
  1. Steel Erection - Safety Requirements (ANSI A10.13).
  2. AISC Code of Standard Practice for Steel Buildings and Bridges.
  3. Ladders - Fixed - Safety Requirements (ANSI A14.3).
- B. Install items plumb and level, accurately fitted, free from distortion or defects. Tolerances shall be as required in the AISC Code of Standard Practice for Steel Buildings and Bridges.
- C. Field-weld components as indicated on the construction drawings. Perform field welding in accordance with AWS D1.1.
- D. Do not field-cut or alter structural members without approval of FERMCO.
- E. After erection and inspection, prime field welds, abrasions, and surfaces not shop primed.
- F. Install drilled expansion anchor bolts as indicated on construction drawings to anchor fabricated steel components.

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- G. Grout under baseplates in accordance with grout manufacturer's instructions and recommendations.
- H. Allow for erection loads and provide temporary bracing to maintain true alignment until completion of erection. Provide temporary foundations as required for erection. The foundations shown on construction drawings are designed for final loads and not to be used as temporary foundations.
- I. Fasteners shall be properly tightened in properly aligned holes.
- J. Touch-Up Painting: Field welds, bolted connections, abraded areas, and other areas where shop coat is discontinuous shall be cleaned in accordance with SSPC SP-3 and shall receive one coat of prime paint to match the shop coating system specified in Section 09900.

3.3 TESTING

- A. Subcontractor shall inspect high-strength bolted connections and welded connections, perform tests and prepare test reports on 100 percent of high-strength bolted connections.
- B. Interpret tests, prepare reports, state in each report whether test specimens comply with requirements, and specifically state any deviations.
- C. Testing Program:
  - 1. FERMCO may inspect structural steel at the shop before shipment; however, FERMCO reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.
  - 2. High-Strength Bolted Connections
    - a. Inspect in accordance with AISC-85 for Structural Joints.
  - 3. Shop and Field Welding
    - a. Inspect and test during fabrication and erection of structural steel assemblies in accordance with AWS D1.1 and as follows:

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- 1) Conduct and document inspections and tests as required. Document types and locations of all defects found in the work. Record work required and performed to correct deficiencies.
- 2) Perform and document a visual inspection of all welds by a documented, qualified inspector.
- 3) Perform nondestructive tests of welds as follows:
  - a) Fillet Welds: One spot test per member. Magnetic particle testing or any other methods of NDT testing, with FERMCO concurrence, shall be used.
- 4) All welds that fail shall be rewelded and retested until passing.
- 5) Perform additional tests, to reconfirm any noncompliance of the original work, and as may be necessary to show compliance of corrected work. Cost of all retesting shall be borne by Subcontractor.

D. Cooperation of Subcontractor with FERMCO:

1. Provide access for FERMCO to places where structural steel work is being fabricated or produced so that inspection and testing can be accomplished as required.
2. Subcontractor shall assist FERMCO Quality Control by providing access to all bolts and welds to be inspected.

E. Correction of Work:

1. Correct and document deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements.

END OF SECTION

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U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4  
SILO SUPERSTRUCTURE DESIGN  
FOR THE SILOS PROJECT

Division 07 - Thermal and Moisture Protection

PARSONS

Prepared by:

\_\_\_\_\_

Date

Checked by:

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Date

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SECTION 07466  
PREFORMED METAL SIDING AND ROOFING

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Preformed metal siding system for walls and roofing, with insulation liners, related flashings, and accessory components.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.  
B. Section 01011 - Submittals.  
C. Section 05500 - Structural Steel.  
D. Section 09900 - Painting

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for Schedule of Drawings.

**1.4 REFERENCES**

- A. American Society of Testing and Materials (ASTM):  
1. ASTM A446/A446M-93 Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process, Structural Physical Quality.  
2. ASTM C665-94 Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- B. Building Officials and Code Administrator International (BOCA):  
1. Ohio Basic Building Code - 1995 (OBBC).

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**1.5 SYSTEM DESCRIPTION**

- A. System: Preformed and pre-finished metal siding system of vertical profile; site assembled with sub-girt framing assembly.
- B. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall to a design pressure of 20 lb/sq ft. plus any negative pressure required by operational design.
- C. Wind Loads:
  - 1. The site-specific basic wind speed shall be 80 mph, per OBBC Section 1112.3.2. The importance factor, I, shall be 1.07, Exposure Category C.
  - 2. Load shall be proportioned and applied as horizontal and uplift forces.
- D. Maximum Allowable Deflection of Panel: 1/180.
- E. System to accommodate, without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.

**1.6 SUBMITTALS**

- A. Provide Submittals per Section 01011.

**1.7 PROJECT CONDITIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum 5 years documented experience approved by manufacturer.

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**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect, and handle products to site.
- B. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- C. Stack pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- D. Prevent contact with materials which may cause discoloration or staining.

**PART 2 PRODUCTS****2.1 MANUFACTURERS**

- A. H.H. Robertson Co.
- B. Steelite Inc.
- C. E.G. Smith Co.
- D. Other manufacturers equal to above.

**2.2 MATERIALS**

- A. Pre-coated Galvanized Steel: ASTM A446, Grade A G90 zinc coating; shop pre-coated with polyvinyl fluoride (PVF) coating (Kynar™).
- B. Exterior Sheet: Maximum 20 gage thick pre-coated steel stock profile as indicated; 12-, 18-, 24-, or 36-inch wide panels; lapped edges, fitted with continuous gaskets filled with sealant. Depending on width of panels used, use gage thickness appropriate.
- C. Liner: Maximum 20 gage thick steel stock; 12-, 18-, 24-, or 36-inch wide panels; interlocking edges, fitted with continuous gaskets filled with sealant. Depending on width of panels used, use appropriate gage thickness of material.

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- D. Sub Girts: 16-gage thick steel, hat shaped, 3/4-inch profile; to attach panel system to building structural frame.
- E. Internal and External Corners: Same material, thickness, and finish as panels; profile to suit system; brake formed to required angles.
- F. Expansion Joints: Same material, thickness, and finish as exterior sheets; exposed fasteners same finish as panel system.
- G. Trim, Closure Pieces: Same material, thickness, and finish as exterior sheets; brake formed to required profiles.
- H. Anchors: Galvanized steel.

### 2.3 ACCESSORIES

- A. Insulation: ASTM C665 Type I Class A glass fiber blanket; thermal resistance R of 11 in the walls and R of 20 in the roof.
- B. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant; color as selected by FERMCO.
- C. Sealants: Manufacturer's standard type suitable for use with installation of system.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers.
- E. Field Touch-up Paint: As recommended by panel manufacturer.

### 2.4 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest practical lengths.

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- C. Fabricate corners in one continuous piece with minimum 18-inch returns and seams.

**PART 3 EXECUTION**

**3.1 SITE CONDITIONS**

- A. Verify that framing members are ready to receive panel system.

**3.2 ERECTION/INSTALLATION/APPLICATION**

- A. Install metal siding system on walls in accordance with manufacturer's instructions.
- B. Fasten siding to structural supports; aligned, level, and plumb.
- C. Locate joints over supports. End lap minimum 2 inches.
- D. Provide expansion joints if required.
- E. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.
- F. Maximum Offset from True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- G. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

**3.3 CLEANING**

- A. Remove site cuttings from finish surfaces.
- B. Clean and wash pre-finished surfaces with mild soap and water, rinse with clean water.

**END OF SECTION**

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SECTION 07900  
JOINT SEALERS

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Preparing substrate surfaces.
- B. Sealant and joint backing.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 03001 - Concrete.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM C919-84 Use of Sealants in Acoustical Applications.
  - 2. ASTM C920-94 Elastomeric Joint Sealants.
  - 3. ASTM D1056-91 Flexible Cellular Materials - Sponge or Expanded Rubber.
- B. Sealant, Waterproofing, and Restoration Institute (SWRI):
  - 1. SWRI - Sealant and Caulking Guide Specification.

**1.5 SUBMITTALS**

- A. Provide submittals as required by Section 01011.

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**1.6 PROJECT CONDITIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section, with minimum 3 years documented experience.
- B. Applicator: Company specializing in performing the work of this section, with minimum 5 years documented experience.
- C. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- D. Any products to be used shall not contain lead or asbestos, or be defined as possible carcinogens.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Dow Corning Corp.
- B. General Electric.
- C. W.R. Meadows Co.

**2.2 MATERIALS**

- A. Silicone Sealant (Type A): ASTM C920, Grade NS, Class 25, Use NT; single component, solvent curing, nonsagging, nonstaining, color as selected; 795 manufactured by Dow Corning.
  - 1. Elongation Capability: 25 percent.
  - 2. Service Temperature Range: -65 to 180 degrees F.
  - 3. Shore A Hardness Range: 30.
  
- B. Silicone Sealant (Type B): ASTM C920, Grade NS, Class 25, Use N; single component, chemical curing, nonsagging, nonstaining, color as selected; 791 manufactured by Dow Corning.
  - 1. Elongation Capability: 25 percent.
  - 2. Service Temperature Range: -65 to 180 degrees F.
  - 3. Shore A Hardness Range: 30.

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**2.3 ACCESSORIES**

- A. Primer: Nonstaining type (recommended by sealant manufacturer) to suit application.
- B. Joint Cleaner: Noncorrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D1056; cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

**PART 3 EXECUTION****3.1 SITE CONDITIONS**

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

**3.2 PREPARATION**

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

**3.3 ERECTION/INSTALLATION/APPLICATION**

- A. Install sealant in accordance with manufacturer's instructions.

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- B. Measure joint dimensions and size materials to achieve 2:1 width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Channel-shape tool joints.
- H. Perform work in accordance with SWRI requirements for materials and installation.

3.4 **CLEANING**

- A. Clean adjacent soiled surfaces.

3.5 **SCHEDULES**

- A. Type A - All glazing and all building materials as indicated on drawings.
- B. Type B - All expansion and control joints.

**END OF SECTION**

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4

SILO SUPERSTRUCTURE DESIGN

FOR THE SILOS PROJECT

Division 08 - Doors and Windows

PARSONS

Prepared by:

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Date

Checked by:

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Date

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SECTION 08110  
STEEL DOORS AND FRAMES

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Steel doors and frames.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.  
B. Section 01011 - Submittals.  
C. Section 08710 - Door Hardware.  
D. Section 08800 - Glazing.  
E. Section 09900 - Painting.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. American National Standards Institute (ANSI):  
1. ANSI-A117.1-86 Buildings and Facilities -  
Providing Accessibility and  
Usability for Physically  
Handicapped People.
- B. American Society for Testing and Materials (ASTM):  
1. ASTM-A525 Sheet Steel, Zinc Coated  
Rev. B-91 (Galvanized) by the Hot-Dip  
Process, General Requirements.
- C. Steel Door Institute (SDI):  
1. ANSI/SDI-100-91 Standard Steel Doors and  
Frames.

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- D. Door Hardware Institute (DHI):
  - 1. The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames, and Builder's Hardware - 91.

**1.5 SUBMITTALS**

- A. Provide Submittals as per Section 01011.
- B. Shop Drawings: Indicate door and frame elevations, internal reinforcement, closure method, and finish.
- C. Product Data: Indicate door and frame configurations and location of cut-outs for hardware and reinforcement.

**1.6 PROJECT CONDITIONS**

- A. Conform to requirements of ANSI/SDI-100 and ANSI A117.1.
- B. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect, and handle products to site.
- B. Protect doors with resilient packaging sealed with heat-shrunk plastic.
- C. Break seal on site to permit ventilation.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Steelcraft.
- B. Republic Builders Products.
- C. Amweld.

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**2.2 MATERIALS**

- A. Doors: SDI-100 Grade II Model 1.
- B. Frames: 16-gage thick material, with 2-inch face, for 1-3/4-inch door, KD type.
- C. Door Core: Cardboard honeycomb.

**2.3 ACCESSORIES**

- A. Silencers: Resilient rubber.
- B. Removeable Stops: Rolled steel channel shape.
- C. Bituminous Coating: Fibered asphalt emulsion.

**2.4 FABRICATION - DOORS**

- A. Astragals for Double Doors: Steel, Z shaped, specifically for double doors.
- B. Fabricate doors with hardware reinforcement welded in place.
- C. Close top and bottom edge of exterior doors with inverted steel channel closure. Seal joints watertight.
- D. Configure exterior doors with special profile to receive recessed weatherstripping.

**2.5 FABRICATION - FRAMES**

- A. Fabricate frames for knock down field assembly.
- B. Mullions for Double Doors: Removable type, of same profiles as jambs.
- C. Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.

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- D. Fabricate frames with hardware reinforcement plates welded in place.
- E. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- F. Prepare frame for silencers and install.

**2.6 FINISH**

- A. Steel Sheet: Galvanized to ASTM A525 G60.
- B. Primer: Baked.
- C. Coat inside of frame profile with bituminous coating.

**PART 3 EXECUTION**

**3.1 ERECTION/INSTALLATION/APPLICATION**

- A. Install doors and frames in accordance with ANSI/SDI-100 and DHI.
- B. Coordinate installation of doors and frames with installation of hardware specified in Section 08710.
- C. Coordinate with steel wall construction for frame anchor placement.
- D. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.
- E. Coordinate installation of glass and glazing.
- F. Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

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3.2 SCHEDULE

A. See Schedule on drawings.

END OF SECTION

SECTION 08710  
DOOR HARDWARE

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Hardware for hollow steel doors.
- B. Thresholds.
- C. Weatherstripping, seals, and door gaskets.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 08110 - Steel Doors and Frame.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. American National Standards Institute (ANSI):
  - 1. ANSI A117.1-86 Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
  - 2. ANSI A156.2-89 Bored and Preassembled Locks and Latches.
- B. National Fire Protection Association (NFPA):
  - 1. NFPA 80-90 Fire Doors and Windows.
  - 2. NFPA 252-90 Fire Tests of Door Assemblies.
- C. American Disabilities Act 1992 (ADA).

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- D. Door Hardware Institute (DHI): **Not Referenced.**
  - 1. The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames, and Builder's Hardware.

**1.5 SYSTEM DESCRIPTION**

- A. Provide all hardware as required by hardware schedule, Article 3.6 of this section. Hardware to be installed per ADA 1992.

**1.6 SUBMITTALS**

- A. See Section 01011 for submittals.
- B. Hardware Schedule: Coordinate hardware with doors, frames, and related work.
  - 1. Organize hardware schedule into "hardware sets" indicating every item required for each door or opening, including:
    - a. Type, style, function, size, and finish of each hardware item.
    - b. Name and manufacturer of each item.
    - c. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
    - d. Mounting locations for hardware.
    - e. Door and frame sizes and materials.
    - f. Keying information.
  - 2. Keying Schedule: Submit separate schedule per FERMCO's desired keying of locks.
- C. Provide special wrenches and tools applicable to each different or special hardware component.
- D. Provide maintenance tools and accessories supplied by hardware component manufacturer.

**1.7 PROJECT CONDITIONS**

- A. Perform work in accordance with the following requirements:
  - 1. ANSI A117.1.

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2. NFPA 80.
3. NFPA 252.

B. Manufacturer: Obtain each type of hardware from a single manufacturer.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Tag each item of package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- C. Packaging of hardware is the responsibility of the supplier. As material is received by the hardware supplier from various manufacturers, sort, and repackage in containers clearly marked to match set numbers of approved hardware schedule.
- D. Inventory hardware jointly with hardware supplier and hardware installer to verify correct count.
- E. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.
- F. Provide secure lock-up for hardware delivered to the project but not yet installed. Control handling and installation of hardware items that are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

#### 1.9 SEQUENCING AND SCHEDULING

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Locks and Latches
  - 1. Sargent.
  - 2. Schlage.
  - 3. Best.
  - 4. Russwin.
  
- B. Cylinders
  - 1. Best (existing grandmaster keying system).
  
- C. Butt Hinges.
  
- D. Door Closers
  - 1. LCN.
  - 2. Dorma.
  - 3. Sargent.
  
- E. Silencers
  - 1. Glynn Johnson.
  - 2. Ives.
  
- F. Thresholds
  - 1. National Guard Products (NGP).
  - 2. Reese.
  - 3. Zero.
  
- G. Gaskets
  - 1. NGP.
  - 2. Reese.
  - 3. Zero.

**2.2 MATERIALS**

- A. Hardware throughout to be substantially manufactured and fabricated, and assembled parts well fitted and of easy operation. Cast work to be true, free from seams, blisters, or other defects. All lines, edges, and ornamental work to be sharp and true. All hardware shall be certified under ANSI A156.2 Series 4000.

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- B. Finish of hardware to be 26D, except as noted.
- C. Door Closers
1. Provide drop plates, brackets, and inverted mounting for conditions where required, LCN 4110 Series or equal.
- D. Levers and Escutcheons
1. All trim similar to Sargent 10 Line Series.
- E. Cylinders
1. Provide appropriate type cylinders for all locks as required by the function of the lock.
  2. Test all cylinders and package cylinders with their respective locks.
  3. Provide keys as specified below for each keyed, different set.
  4. Provide cylinders with a minimum of five pin-tumblers for master or grandmaster keying.
- F. Strike Plates
1. Strike plates to be wrought, box type.
- G. Silencers: Provide silencers, Glynn Johnson GJ 64 or equal, on all interior hollow metal frames.
- H. Locksets and Latchsets
1. Provide heavy-duty locksets, Sargent 10 Line Series or equal.
  2. Locks to have face plates, proper backset, an anti-rejection split latch bolt, and radius strikes; and to fit ANSI standard cutout.
- I. Cylinders
1. "Best" seven pin figure eight key removable cores shall be supplied with temporary construction cores installed.
  2. Construction cores will be returned to "Best" after installation of final cores by FERMO.
  3. Final cores shall be keyed to the Site Standard Master Keyed System; account #FEE125, "M" keyway, seven pin, series "BF" or modified to a keying plan.

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4. Final cores, with one key each and a control key for the construction cores, shall be shipped directly to FERMCO. FERMCO will install final cores and make additional keys as required.

J. Closers: Provide LCN 1460 series or equal.

K. Weatherstripping: Provide perimeter seals on all doors. Seals by National Guard Products, Inc. or equal.

L. Silo Dome Seal: As manufactured by Presray Corp., Pawling, N.Y.

### 2.3 ACCESSORIES

#### A. Master Keys

1. Master key all locks to complement existing system.
2. Grandmaster key all locks, as appropriate.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. Factory or shop prepare all materials for installation of hardware.

### 3.2 ERECTION/INSTALLATION/APPLICATION

A. Follow hardware manufacturer's instructions and recommendations.

B. Install surface-mounted items after substrates have been completely finished; install recessed items and recessed portions of items before finishes are applied and provide suitable, effective protection.

1. When surface-mounted items are installed before final finish, remove, store, and reinstall, or apply suitable effective protection.

C. Mount at heights indicated in "Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames" by the Door Hardware Institute.

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- D. Set units level, plumb, and true to line and location.
- E. Reinforce substrates as necessary for proper installation and operation.
- F. Set thresholds in full bed of sealant.

### 3.3 ADJUSTMENT

- A. Adjust each operating item of hardware and each door for proper operation and function; replace units which cannot be adjusted to operate freely and smoothly.
- B. Adjust door closers to compensate for operation of heating and ventilating systems.

### 3.4 CLEANING

- A. Clean adjacent surfaces soiled by hardware installation.

### 3.5 DEMONSTRATION

- A. Deliver keys and extra blanks (two for every key) to FERMCO.

### 3.6 HARDWARE SCHEDULE

- A. Hardware Sets
  1. Exterior Doors (except 101)
    - a. One cylinder; Best 26D.
    - b. One lockset; Sargent 10 Line, 26D.
    - c. One closer; LCN 4010 Series Smoothee.
    - d. 1 1/2 sets; Hinges
    - e. One set - exit device (Panic); Von Duprin Series 88.
    - f. One threshold.
    - g. One set weatherstripping.
  2. Exterior double doors
    - a. One cylinder; Best 26D.
    - b. One lockset; Sargent 10 Line, 26D.
  3. Access Door
    - a. One cylinder; Best 26D.

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- b. One lockset; Sargent 10 Line, 26D.
- c. One set hinges.
- d. One set weatherstripping.
- 4. Door 101
  - a. One closer; LCN 4010 Series Smoothee.
  - b. One and one-half sets; hinges.
  - c. One set - exit device (Panic); Von Duprin Series 88.
  - d. One threshold.
  - e. One set; weather stripping.
- 5. Interior Double Doors
  - a. Two closers; LCN 4010 Heavy duty.
  - b. Four sets hinges.
  - c. One set weatherstripping.
  - d. One set astragals.
  - e. One set heavy duty surface bolts.
  - f. Provide stops to keep doors from opening more than 90 degrees.

END OF SECTION

SECTION 08800  
GLAZING

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Glass and glazing for sections referencing this section for products and installation.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 08110 - Steel Doors and Frames.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. Flat Glass Marketing Association (FGMA):
  - 1. Glazing Manual.
  - 2. Sealant Manual.
- B. Sealed Insulating Glass Manufacturers Association (SIGMA).

**1.5 SYSTEM DESCRIPTION**

- A. Glass and glazing materials of this section shall provide continuity of building enclosure vapor and air barrier.

**1.6 SUBMITTALS**

- A. Provide Submittals as per Section 01011.

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**1.7 PROJECT CONDITIONS**

- A. Perform work in accordance with FGMA Glazing Manual, FGMA Sealant Manual, and SIGMA for glazing installation methods.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. PPG Industries, Inc.
- B. Libbey-Owens-Ford Co.
- C. Pittsburgh Corning Corp.

**2.2 MATERIALS**

- A. Wire Glass (Type FG-G): Clear, polished both sides.
- B. Acrylic Sealant (Type GC-C): Single component, solvent curing, cured Shore A hardness of 15-25; non-bleeding.

**2.3 GLAZING ACCESSORIES**

- A. Setting Blocks: Neoprene; 80 - 90 Shore A Durometer hardness.
- B. Spacer Shims: Neoprene; 50 - 60 Shore A durometer hardness.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device.
- D. Glazing Splines: Polyvinyl chloride extruded shape to suit glazing channel retaining slot.
- E. Glazing Clips: Manufacturer's standard type.

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**PART 3 EXECUTION****3.1 SITE CONDITIONS**

- A. Verify that openings for glazing are correctly sized within tolerance required by FGMA, and that glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

**3.2 PREPARATION**

- A. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

**3.3 INTERIOR - WET METHOD (COMPOUND AND COMPOUND)**

- A. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24-inch centers, kept 1/4-inch below sight line.
- B. Locate and secure glazing pane using glazers' clips.
- C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

**3.4 CLEANING**

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after work is complete.
- C. Clean glass.

**3.5 SCHEDULES**

- A. See drawing.

**END OF SECTION**

U.S DEPARTMENT OF ENERGY

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4

SILO SUPERSTRUCTURE DESIGN

FOR THE SILOS PROJECT

Division 09 - Finishes

PARSONS

Prepared by:

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Date

Checked by:

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Date

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SECTION 09900  
PAINTING

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. All labor, material, equipment, tools, and services required to complete all painting work as required by the drawings and/or as specified herein.
- B. Except as otherwise indicated or hereinafter specified, all necessary preparation and complete finishing of the following:
  - 1. All miscellaneous iron items, both prime coated and galvanized.
  - 2. Field painting and/or touch-up of all piping.
  - 3. Uninsulated piping, exposed electric raceway, electrical cabinets, boxes, etc., in contracts for other divisions of the work and furnished either bare, zinc-coated (galvanized), or prime coated.
  - 4. Color coding or indication of piping.
- C. Surfaces not painted under this section:
  - 1. Stainless steel and aluminum.
  - 2. Factory finished items.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 05120 - Structural Steel.
- D. Section 05500 - Metal Fabrication.
- E. Section 07900 - Joint Sealers.

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1.3 REFERENCE DRAWINGS

- A. See Section 01012 for the Schedule of Drawings.

1.4 REFERENCES, CODES, AND STANDARDS

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM D16-95 Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- B. National Paint and Coatings Association (NPCA):
  - 1. Guide to U.S. Government Paint Specifications - 1988.
- C. Painting and Decorating Contractors of America (PDCA):
  - 1. Architectural Specifications Manual - Rev. 90.
- D. Steel Structures Painting Council (SSPC):
  - 1. Steel Structures Painting Manual - Rev. 91.
    - a. SP-6 - Commercial Blasting Cleaning.
    - b. Paint 13 - Red or Brown One-Coat Shop Paint.
    - c. Paint 20 - Zinc-Rich Primers.
- E. American National Standards Institute (ANSI):
  - 1. ANSI A13.1-81 Scheme for the Identification of Piping Systems.
  - 2. ANSI Z535.1-91 Safety Color Code for Marking Physical Hazards.
  - 3. ANSI Z535.5-91 Accident Prevention Tags for Temporary Hazards.
- F. Federal Specifications (Fed. Spec.):
  - 1. Fed. Spec. TT-E-505A Enamel, Odorless Alkyd-High Gloss, Interior, White and Light Tints.
  - 2. Fed. Spec. TT-E-508C Interior Semigloss Tints and White.
  - 3. Fed. Spec. TT-E-543 Enamel, Interior, Undercoat, Tints and White.
  - 4. Fed. Spec. TT-P-636 Primer Coating, Alkyd, Wood and Ferrous Metal.

5. Fed. Spec. TT-P- Primer-Latex Base  
650C Type I (R/M) Interior White for Gypsum  
Board Primer Coating.

G. Federal Standards (FS):

1. FS No. 595A Colors.

H. Occupational Safety and Health Administration (OSHA):

1. OSHA 1910.144-93 Safety Color Code for Marking  
Physical Hazards.

2. OSHA 1910.145-93 Specifications for Accident  
Prevention Signs and Tags.

1.5 SYSTEM DESCRIPTION

A. Conform to ASTM D16 for interpretation of terms used in  
this section.

1.6 SUBMITTALS

A. Provide submittals as required by Section 01011.

1.7 PROJECT CONDITIONS

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

B. Applicator: Company specializing in performing the  
work of this section, with minimum 5 years documented  
experience approved by manufacturer.

c. Exterior painting shall not be done during or  
immediately following rainy or frosty weather, or when  
the temperature is below 50 degrees F or likely to drop  
to freezing, or when surfaces are exposed to hot sun,  
or temperature is above 90 degrees F (or likely to be)  
during the drying period.

D. Interior work shall be done only when the building has  
been thoroughly dried out by natural or artificial  
heat, and when the work area is properly heated and  
ventilated, clean, and as dust-free as possible. Apply

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interior finishes only when a room temperature of at least 60 degrees F can be maintained during application of treatments and until coatings are dry.

**1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect, and handle products to site.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, clean-up requirements, color designation, and instructions for mixing and reducing. Labels to be kept readable at all times.
- D. Store paint materials at a minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area and in a paint storage safety cabinet, as required by manufacturer's instructions and where directed by the Construction Manager. Keep storage space clean and accessible. Oil- or paint-soaked rags or waste shall be placed in tight-covered metal containers or removed from the premises at the close of each day's work. Take every precaution to avoid damage by fire. In no case shall the amount of materials stored exceed that permitted by local ordinances.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Sherwin Williams
- B. Pratt and Lambert
- C. Porter Paints

**2.2 MATERIALS**

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags. Coatings shall be compatible. All coatings (i.e., primer and finish coats) shall be free of lead and chromates.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners, and other materials not specifically indicated but required to achieve the finishes specified of commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.
- E. Follow NPCA guide for government specifications.
1. Paints and paint types are as follows:
    - a. Finish coating, gloss alkyd, conforming to Fed. Spec. TT-E-505A.
    - b. Finish coating, alkyd, conforming to Fed. Spec. TT-E-508C.
    - c. Primer coating, alkyd, conforming to Fed. Spec. TT-E-543.
    - d. Primer coating, alkyd, conforming to Fed. Spec. TT-P-636.
    - e. Finish coating, latex, conforming to Fed. Spec. TT-P-650C.

**PART 3 EXECUTION****3.1 SITE CONDITIONS**

- A. Before commencing work on surfaces of any type, the Subcontractor shall carefully inspect same and be satisfied that they are dry and in all other respects suitable to receive the specified treatment.

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- B. Application of any coating to a surface will constitute acceptance of the surface by the Subcontractor. If, after treatment, the completed finish (or any portion thereof) blisters, checks, peels, or otherwise shows indication of dampness or other irregular condition of surface, the Subcontractor shall remove the applied treatment and refinish the part affected at no cost to the Owner and to the satisfaction of the Construction Manager. (The painting Subcontractor should determine dryness of all moisture-holding materials by use of a reliable electronic moisture meter.)

### 3.2 PREPARATION

#### A. General

1. Subcontractor to be responsible for proper preparation of all surfaces to receive the particular treatment specified.
2. All usual preparatory measures common to painters' work, as well as such special procedures as are herein stipulated, shall be employed.

#### B. Structural Steel

1. Prepare surfaces in accordance with SSPC (SP-6, Paint 13, and Paint 20) procedures. Spot-prime all bare metal areas immediately with compatible, rust-inhibiting primer. Prepare steel for final coat.

#### C. Prime-Coated Miscellaneous and Ornamental Ferrous Metal

1. Prepare surfaces of miscellaneous and ornamental ferrous metal items such as steel door frames, hollow metal doors, exposed lintels, railings, ornamental brackets, etc., as specified for exposed-to-view structural steel parts in Article 3.2, Paragraph B.
2. Fill any open joints and bare tool marks in parts furnished in manufacturer's baked-on prime coat with mineral filler, to make inconspicuous; sand smooth, then spot-prime.

D. Zinc-Coated Metal Parts; Galvanized or Zinc-Coated by Other Process

1. Unless the prime coat material to be used is recommended by its manufacturer for application over zinc-coated surfaces of the type at hand, after cleaning and any necessary de-glossing only, surfaces must be given phosphate pretreatment prior to application of prime coat; usual "vinegar etch" or acid pretreatment (wash) will not be permitted.
2. Phosphate pretreatment: Crystalline zinc phosphate type; either "Lithoform," made by the American Chemical Paint Co., Ambler, Pennsylvania, or "Galaprep No. S," made by Neilson Chemical Co., Detroit, Michigan, as approved by the Construction Manager. Follow manufacturer's directions exactly as to cleaning prior to treatment, application of treatment, and after-rinse.
3. Preparation of surfaces for directly applied prime coat: Clean all surfaces thoroughly with mineral spirits, naphtha, or other approved solvent, completely removing all oil, grease, and other film. Roughen with steel wool, as necessary, to remove gloss.
4. Primer must be applied at once, following either cleaning only or phosphate pretreatment.

E. Caulking

1. Other required caulking common to painter's work shall be performed under Section 07900.
2. Use a resin-base, gun type, elastic caulking compound, free of volatile thinners; add no thinner.
3. Apply with gun and follow with tool, as required, to form a smooth coved fillet of the minimum required width, at projecting, overlapping, and fully recessed frames. Fill flush and tool slightly concave where frame is flush or just scant of flush. Apply well in advance of scheduled paint treatment; compound must have formed a firm, dust-free surface skin before prime coat is applied. Avoid smearing adjacent wall and/or metal; clean off any misplaced compound at once.

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### 3.3

### APPLICATION

- A. All work shall be done by skilled mechanics in a workmanlike manner; all coats flowed on, or brushed out, to a uniform film. Completed work shall be free of runs, sags, blocked angles, raised grain, and all other evidence of poor or careless workmanship. Follow PDCA instruction manual.
- B. Tint all undercoats toward the color of the final coat, with shade of each coat sufficiently different from that of work in place to permit easy identification.
- C. Allow sufficient time before recoating to ensure proper drying of the preceding coat.
- D. Exercise care to avoid getting material on a surface not intended to receive it. Remove any misplaced material or resultant stain, leaving the surface in proper condition.
- E. General
  - 1. Following surface preparation as specified, apply coats or treatments as listed below on the several kinds of surfaces required to be treated.
  - 2. Refer to finish schedule and architectural drawings for the extent of wall and ceiling surfaces, metal doors, frames, trim, etc., requiring finish, and to drawings and specifications for mechanical and electrical work for extent of ductwork, piping, conduit, mechanical system devices, heating units, grilles, etc.
  - 3. All coats specified herein are in addition to primer, sealer, or other preparatory or protective coats specified in other sections of this specification package or in the specifications for other contracts.
- F. Structural Steel for Pre-Engineered Buildings
  - 1. Finish Treatment: Two coats latex gloss enamel.

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## G. New Work

1. Exposed miscellaneous steel items, lintels:
  - a. Primer: One coat primer.
  - b. Finish treatment: Two coats exterior latex gloss enamel.
2. Mechanical equipment items:
  - a. Finish treatment: First coat - exterior latex gloss enamel.
  - b. Second coat - exterior latex gloss enamel.
3. Pipe, Valves, and Fittings - Carbon Steel:
  - a. Two coats of epoxy-polyamids coating. Dry film thickness of 4 mils per coat.
4. Other Piping, Electrical Conduit in Exposed Locations:
  - a. Primer: One coat primer.
  - b. Finish Treatment: Two coats exterior gloss latex enamel.
5. Pipe Covering in Exposed Locations:
  - a. Primer: One coat primer.
  - b. Finish Treatment: Two coats exterior semi-gloss latex enamel.
6. Checkered Plate:
  - a. Primer: One coat primer.
  - b. Finish Treatment: Two coats non-skid exterior latex enamel safety paint.

## H. Miscellaneous and ornamental fabricator-primed ferrous metals

1. Includes prime-coated equipment items and their supports, in addition to parts regularly classified as "miscellaneous and ornamental ferrous metals." Any parts as named, but furnished bare, shall receive one coat of metal primer (as approved), followed by the treatment herein specified.

## I. Outside surfaces of ductwork, metal housings

1. First coat - pigmented primer-sealer.
2. Second coat - final coat as on adjacent wall or ceiling.

- J. Mechanical equipment items furnished in prime coat
  - 1. Finish treatment: Two coats latex interior-exterior enamel; gloss or machinery enamel.

#### 3.4 CLEANING

- A. As work proceeds, promptly remove paint where spilled, splashed, or splattered.
- B. During progress of work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and materials which may constitute a fire hazard; place in closed metal containers as directed by FERMCO.

#### 3.5 PROTECTION

- A. Provide clean drop cloths and other protection as approved to protect floors, doors, and other parts from damage. Where any work is accidentally spattered, clean promptly, and leave in satisfactory condition.

#### 3.6 SAFETY PAINTING

- A. The Subcontractor shall apply safety painting for the marking of physical hazards and identification of piping systems, as required herein. Accident prevention signs will be provided by others.
- B. Safety colors shall be applied by the Subcontractor where and as required on and in the appropriate areas and equipment. The safety color code shall mark physical hazards and shall continue to provide an orderly, coordinated standard of practice for the plant and the safety of workers.
- C. Color coding and designation shall comply with current OSHA 1910.144, OSHA 1910.145, ANSI Z535.5, ANSI Z53.1, and Federal Standard No. 595A.

D. The following safety colors shall have Federal Standard numbers as follows:

1. Red - No. 11105
2. Yellow - No. 13655
3. Orange - No. 12246
4. Purple - No. 17142 (Magenta)
5. Green - No. 14260
6. Blue - No. 15102
7. Black - No. 17038

E. The color codes shall be used for the following identifications:

1. Red - Exposed fire protection systems shall be painted a continuous red.
2. Vivid Orange - Vivid orange shall be restricted to surface areas, machine guards where there is the potential for cutting, crushing, thermal burns, or electrical shock to personnel.
3. Magenta - Magenta shall be used to identify equipment, housing, containers, appurtenances, etc., which contain radioactive materials or contamination, where necessary to differentiate them from similar non-radioactive items. Approved signs or tags exhibiting the standard three-bladed magenta radiation symbol on yellow background shall be used to identify the nature and/or magnitude of the radiation hazard together with specific safety instructions (by others).
  - a. The following is a representative list of items that would typically be identified by magenta:
    - 1) "Hot" and "warm" drains (on floor drains use metal tags).
    - 2) "Hot" filter housing.
    - 3) Radiation ion exchangers.
    - 4) "Hot" waste containers (other than buried tanks).
    - 5) Radioactive sampling connections.
    - 6) Piping containing radioactive materials or contamination.
    - 7) Doors restricting access to radiation zones.

4. Green - Green shall be the basic color for designating safety and location of first aid equipment (other than fire fighting equipment).
5. Blue - Blue is limited to electrical equipment. Main electrical disconnects in all buildings shall be identified by stencil or label.
6. Black, White, or a Combination of These Two - Black, white, or a combination of these two shall be the basic colors for designating housekeeping and traffic markings.

F. Color coding for identification of piping systems shall conform to ANSI A13.1. Piping systems are defined as conduits for the transport of gases, liquids, and semi-liquids.

1. The Contractor shall identify pipes as follows:
  - a. Content and direction of flow of piping systems shall be identified by stencil or Brady "Quik-Labels" (mastic back) painted or fixed on pipe or pipe covering. Such identification shall be located so as to ensure immediate recognition of piping system content and direction of flow.
  - b. Piping shall be color coded by applying a painted solid color band completely encircling the pipe. The band shall be a minimum of 9 inches in length (longer when necessary to accommodate the full identification) and shall provide a minimum 2-inch border. The color bands shall be applied close to all valves, branches, and changes of direction, on both sides of each floor, wall, or barrier through which the line passes, every connection to equipment or service outlet, and at a maximum of 50-foot intervals on straight runs of pipe.
2. Line identification and directional flow arrows shall be arranged and located so as to be easily read by a person standing on the floor or at the normal access location of the pipe. Color codes, service codes, service descriptions, line numbers, and other required information is provided in the Subcontract Special Conditions.

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3. As an aid to the Subcontractor in identifying line numbers and flow direction, piping will have been marked in black ink with the line numbers and flow arrows at each end of each pipe spool after piping installation is complete.
- a. The stenciled or mastic-backed labels shall include pipe content identification, line number, and unusual qualities of the pipe contents (i.e., hot, cold, pressure in lbs./sq. in.).
  - b. On service piping, either liquid or gas, apply black arrows of same height and with same background color as adjacent identification labels, to indicate direction of flow.
  - c. Lettering size shall be in accordance with the information in the chart below:

<u>Nominal Pipe Diameter*</u>	<u>Size of Legend Letters*</u>
3/4 to 1-1/4	1/2
1-1/2 to 2	3/4
2-1/2 to 6	1-1/4
8 to 10	2-1/2
Over 10	3-1/2

\* All dimensions are given in inches.

- d. Pipes to be marked shall first be wiped clean of dirt, dust, grease, and moisture. When applying mastic-backed label, pressure must be applied so that the label will lie smooth and flat. Apply a brush coat of clear lacquer after label has been applied to pipe, making sure edges of label are well covered. Stencils may be used without use of lacquer cover.

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- e. Labels shall be applied only after the final inspection of the piping systems. The labels shall be applied on piping systems that require painting after the final coat has cured. Labels shall be applied in accordance with the manufacturer's recommendations.

END OF SECTION

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FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERMCO Subcontract No. 2-21487

Project No.: 40200

OPERABLE UNIT 4

SILO SUPERSTRUCTURE DESIGN

FOR THE SILOS PROJECT

Division 10 - Specialties

PARSONS

Prepared by:

\_\_\_\_\_

Date

Checked by:

\_\_\_\_\_

Date

SECTION 10211  
METAL WALL LOUVERS

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Fixed louvers and frames.
- B. Bird screening.

**1.2 RELATED SECTIONS**

- A. Section 01010 - General Requirements.
- B. Section 01011 - Submittals.
- C. Section 07900 - Joint Sealers.
- D. Section 07466 - Preformed Metal Siding and Roofing.

**1.3 REFERENCE DRAWINGS**

- A. See Section 01012 for the Schedule of Drawings.

**1.4 REFERENCES**

- A. Air Movement Control Association (AMCA):
  - 1. AMCA 500-82 Test Method for Louvers, Dampers, and Shutters.

**1.5 SYSTEM DESCRIPTION**

- A. Louver: To permit passage of air at a velocity as required by AMCA 500 without blade vibration or noise.
- B. Louver: To permit 50 percent free area, minimum.

**1.6 SUBMITTALS**

- A. Provide submittals as per Section 01011.

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**1.7 PROJECT CONDITIONS**

- A. Perform work in accordance with AMCA Certification for Louvers.
- B. Manufacturer: Company specializing in manufacturing products specified in this section, with minimum 3 years documented experience.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Airolite Co.
- B. Louvers & Dampers, Inc.
- C. Ruskin.

**2.2 MATERIALS**

- A. Furnish and install extruded aluminum drainable blade louver similar to Type K6746, as manufactured by the Airolite Company, Marietta, Ohio. Louvers shall be 6 inches deep and assembled entirely by welding. Blades and frame shall be 0.81 inch extruded aluminum, alloy 6063-T5. All louvers shall be factory finished after assembly with a Kynar® 500 coating in a color selected from the manufacturer's chart.
- B. Louvers shall bear AMCA Licensed Ratings Seals for air performance and water penetration ratings.
- C. Bird Screen: Interwoven wire mesh of aluminum, 0.063-inch-diameter wire, 1/2-inch open weave, diagonal design.
- D. Backdraft Damper (if required): Shall be extruded aluminum with linkage concealed in frame, mounted behind the cover.

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**2.3 ACCESSORIES**

- A. Fasteners and Anchors: Stainless steel type.
- B. Primer: Zinc chromate, alkyd type.
- C. Flashings: Of same material as louver frames.
- D. Sealants: Type specified in Section 07900.

**PART 3 EXECUTION****3.1 EXAMINATION**

- A. Verify that prepared openings and flashings are ready to receive work and that opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated on shop drawings.
- C. Coordinate the work with installation of metal siding.

**3.2 INSTALLATION**

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure that moisture is shed from flashings and diverted to exterior.
- D. Secure louvers in opening framing with concealed fasteners.
- E. Install bird screen and frame to interior of louver.
- F. Install perimeter sealant and backing rod in accordance with Section 07900.

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3.3        **ADJUSTING**

- A.        Adjust backdraft dampers for freedom of movement of control mechanism. Lubricate operating joints.

3.4        **CLEANING**

- A.        Clean surfaces and components.

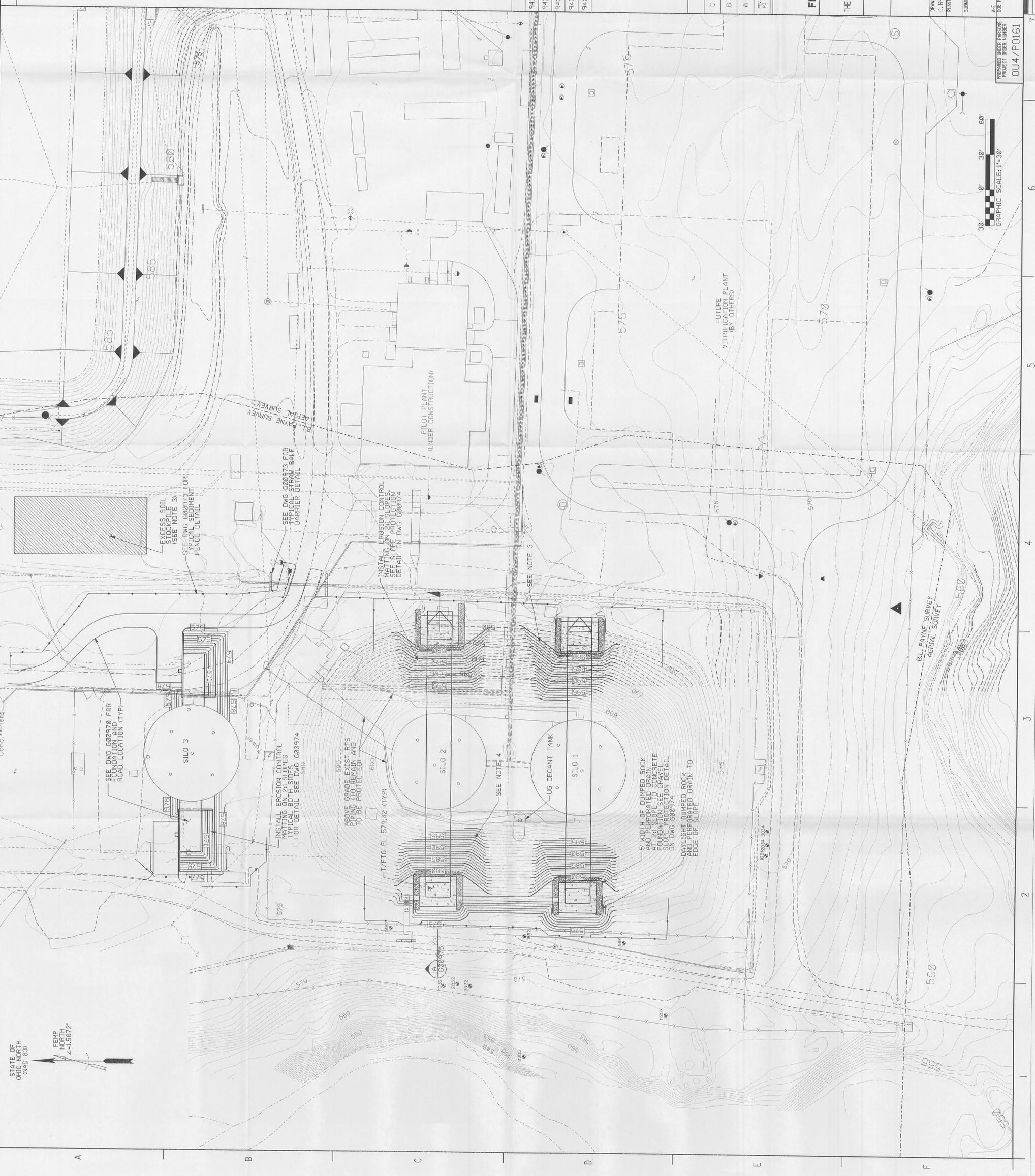
3.5        **SCHEDULE**

- A.        See drawings for sizes and locations of louvers.

**END OF SECTION**

NOTES

- EXISTING CONDITIONS SHOWN ON THIS DRAWING WERE PREPARED FROM TOPOG. SURVEY PROVIDED DATA FROM THE DOCUMENTS LISTED BELOW  
 EXISTING SITE DATA SOURCE (IN PLANT FILES)  
 FERMCO GROUND UTILITY DRAWINGS  
 FEMP CONTRACTOR PROJECT DESIGN DOCUMENTS  
 FIELD SURVEY BY B. L. PAYNE AND ASSOCIATES FEBRUARY 1996
- SEE DWG. 94X-5900-G-00970 SITE/UTILITY PLAN FOR LOCATIONS AND FEATURES TO BE REMOVED.
- CONTRACTOR IS TO PLACE/STOCKPILE CONTAMINATED SOIL IN DESIGNATED AREA.
- STABILITY OF 2H:1V EXCAVATION SLOPE IN THIS AREA IS TO BE VERIFIED BY FERMCO PRIOR TO CONSTRUCTION.



REF DWG NO.	DRAWING INDEX	DRAWING TITLE
94X-5900-X-00968	DRAWING INDEX	
94X-5900-X-00969	LEGEND AND SYMBOLS	
94X-5900-G-00970	SITE/UTILITY PLAN	
94X-5900-G-00973	DETAILS - SHEET 1 OF 2	
94X-5900-G-00974	DETAILS - SHEET 2 OF 2	

**PRELIMINARY**  
 NOT FOR CONSTRUCTION

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

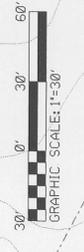
**UNITED STATES DEPARTMENT OF ENERGY**  
**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

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

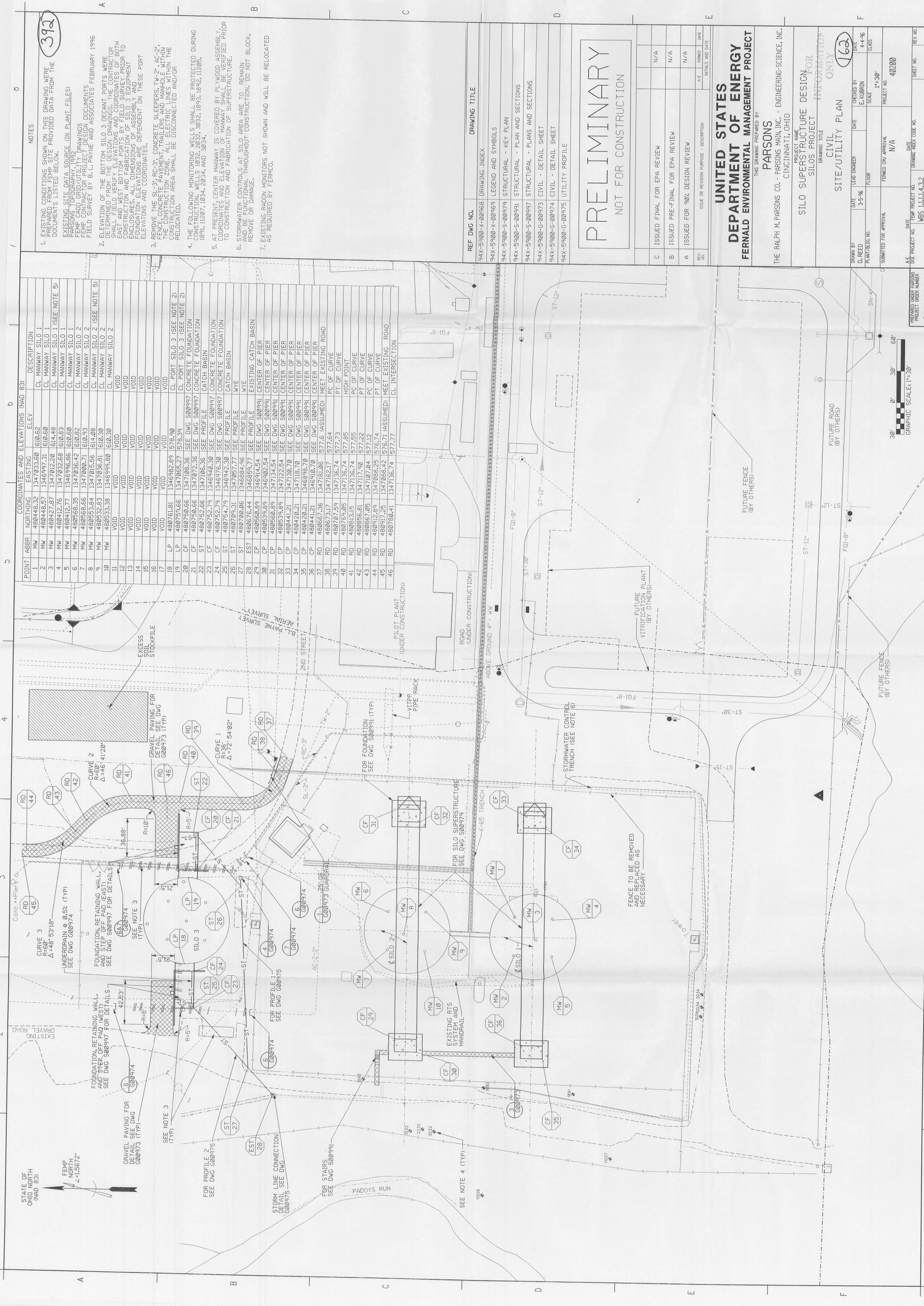
DATE	LEAD ENGINEER	DATE	CHECKED BY
3-5-96	E. KUBRIN	04/03/96	E. KUBRIN

PROJECT NAME: SILO SUPERSTRUCTURE DESIGN  
 DRAWING TITLE: CIVIL GRADING PLAN  
 PROJECT NO.: 40200  
 SCALE: 1"=30'

DATE: 00-90701  
 TEMP PROJECT NO.: WBS 1111.4.32  
 DRAWING INDEX CODE NO.: 94X-5900-G-00971  
 SHEET NO.: G0002  
 REV. NO.: C



PREPARED UNDER PARSONS PROJECT ORDER NUMBER  
 OU4/P0161



COORDINATES AND ELEVATIONS (MAD 83)

POINT	ABBR	NORTHING	EASTING	ELEV	DESCRIPTION
1	MW	480448.32	1347033.50	610.62	CL MANWAY SILO 1
2	MW	480448.57	1346997.31	610.60	CL MANWAY SILO 1
3	MW	480427.87	1347012.20	614.48	CL MANWAY SILO 1 (SEE NOTE 5)
4	MW	480412.76	1347032.68	610.83	CL MANWAY SILO 1
5	MW	480412.77	1346996.66	610.60	CL MANWAY SILO 1
6	MW	480568.66	1347036.42	610.82	CL MANWAY SILO 2
7	MW	480568.66	1347000.71	610.93	CL MANWAY SILO 2
8	MW	480533.84	1347015.56	614.08	CL MANWAY SILO 2 (SEE NOTE 5)
9	MW	480532.83	1347036.81	610.30	CL MANWAY SILO 2
10	MW	480533.38	1346998.80	610.30	CL MANWAY SILO 2
11	VOID	VOID	VOID	VOID	VOID
12	VOID	VOID	VOID	VOID	VOID
13	VOID	VOID	VOID	VOID	VOID
14	VOID	VOID	VOID	VOID	VOID
15	VOID	VOID	VOID	VOID	VOID
16	VOID	VOID	VOID	VOID	VOID
17	LP	480761.81	1346982.89	1578.90	CL PORT SILO 3 (SEE NOTE 2)
18	LP	480759.66	1347065.27	1578.39	CL PORT SILO 3 (SEE NOTE 2)
19	CF	480750.66	1347008.36	SEE DWG 500997	CONCRETE FOUNDATION
20	CF	480750.66	1347072.36	SEE DWG 500997	CONCRETE FOUNDATION
21	ST	480752.66	1347106.36	SEE PROFILE	CATCH BASIN
22	CF	480752.75	1346940.30	SEE DWG 500997	CONCRETE FOUNDATION
23	CF	480752.75	1346976.30	SEE DWG 500997	CONCRETE FOUNDATION
24	ST	480754.79	1346942.30	SEE PROFILE	CATCH BASIN
25	CF	480754.79	1347057.77	SEE PROFILE	WYE
26	ST	480700.06	1346884.96	SEE PROFILE	WYE
27	EST	480676.44	1346859.77	SEE PROFILE	EXISTING CATCH BASIN
28	CP	480560.89	1346914.54	SEE DWG 500991	CENTER OF PIER
29	CP	480559.89	1346902.64	SEE DWG 500991	CENTER OF PIER
30	CP	480560.89	1347134.54	SEE DWG 500991	CENTER OF PIER
31	CP	480559.89	1347122.54	SEE DWG 500991	CENTER OF PIER
32	CP	480441.21	1347130.70	SEE DWG 500991	CENTER OF PIER
33	CP	480441.21	1347118.70	SEE DWG 500991	CENTER OF PIER
34	CP	480420.21	1347118.70	SEE DWG 500991	CENTER OF PIER
35	CP	480420.21	1346988.70	SEE DWG 500991	CENTER OF PIER
36	CP	480441.21	1346910.70	SEE DWG 500991	CENTER OF PIER
37	RD	480667.37	1347181.06	577.6	MEET EXISTING ROAD
38	RD	480673.17	1347162.17	577.64	PT. OF CURVE
39	RD	480707.59	1347136.74	577.73	PT. OF CURVE
40	RD	480759.05	1347136.74	577.85	HIGH POINT
41	RD	480813.15	1347136.74	577.55	PC OF CURVE
42	RD	480856.81	1347117.90	577.22	PT. OF CURVE
43	RD	480867.05	1347107.04	577.12	PC OF CURVE
44	RD	480912.89	1347088.25	576.74	PT. OF CURVE
45	RD	480917.25	1347066.42	576.71	MEET EXISTING ROAD
46	RD	480780.41	1347136.74	577.77	CL INTERSECTION

NOTES

- EXISTING CONDITIONS SHOWN ON THIS DRAWING WERE PREPARED FROM FERMCO SITE PROVIDED DATA FROM THE DOCUMENTS LISTED BELOW.
- EXISTING SITE DATA SOURCE (IN PLANT FILES) PARSONS SUPERSTRUCTURE DESIGN DOCUMENTS FERM CONTRACTOR PROJECT DESIGN DOCUMENTS FERM CONTRACTOR PROJECT DESIGN DOCUMENTS FEBRUARY 1996
- ELEVATION OF THE BOTTOM SILO 3 DECANT PORTS WERE DETERMINED FROM PLANT DRAWINGS. THE CONTRACTOR SHALL VERIFY ELEVATIONS OF DECANT PORTS BY BOTH EAST AND WEST BOTTOM PORTS BY FIELD SURVEY PRIOR TO CONSTRUCTION AND FABRICATION OF SILO 3 EQUIPMENT ENCLOSURES. ALL DIMENSIONS OF ASSEMBLY AND ELEVATION ACTIONS ARE DEPENDENT ON THESE PORT ELEVATIONS AND COORDINATES.
- REMOVE THE SL-3, RC-3, CONCRETE SLEEPERS, TW-2, AC-2, THE CONCRETE PAVEMENT, TRAILERS AND MANHOLE WITHIN THE CONSTRUCTION AREA SHALL BE DISCONNECTED AND/OR RELOCATED.
- THE FOLLOWING MONITORING WELLS SHALL BE PROTECTED DURING CONSTRUCTION, WELLS 1032, 2032, 3032, 1893, 1892, 1205, 1891, 11207, 1034, 2034, AND 3034.
- AT PRESENT, CENTER MANWAY IS COVERED BY PL YWOOD ASSEMBLY. COORDINATES AND ELEVATION OF MANWAY SHALL BE VERIFIED PRIOR TO CONSTRUCTION AND FABRICATION OF SUPERSTRUCTURE.
- STORMWATER CONTROLS AT SILO AREA ARE TO REMAIN. DO NOT BE FUNCTIONAL THROUGHOUT CONSTRUCTION. DO NOT BLOCK, REMOVE OR DAMAGE.
- EXISTING RADON MONITORS NOT SHOWN AND WILL BE RELOCATED AS REQUIRED BY FERMCO.

REF DWG NO. DRAWING INDEX

94X-5900-X-00968	DRAWING INDEX
94X-5900-X-00969	LEGEND AND SYMBOLS
94X-5900-S-00979	STRUCTURAL - KEY PLAN
94X-5900-S-00991	STRUCTURAL - PLAN AND SECTIONS
94X-5900-S-00997	STRUCTURAL - PLANS AND SECTIONS
94X-5900-G-00973	CIVIL - DETAIL SHEET
94X-5900-G-00974	CIVIL - DETAIL SHEET
94X-5900-G-00975	UTILITY PROFILE

PRELIMINARY  
NOT FOR CONSTRUCTION

C	ISSUED FINAL FOR EPA REVIEW	N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW	N/A
A	ISSUED FOR 90% DESIGN REVIEW	N/A
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	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  
SILO SUPERSTRUCTURE DESIGN FOR SILOS PROJECT

DRAWING TITLE  
SITE/UTILITY PLAN

DATE  
3-5-96

CHECKED BY  
E. KUBRIN

DATE  
4-4-96

SCALE  
1"=30'

CLASS  
N/A

PROJECT NO.  
40200

DATE  
11/11/43

DRAWING INDEX CODE NO.  
00-90701

SHEET NO.  
C0001

REV. NO.  
C



- THIS DRAWING PACKAGE PRESENTS THE DETAILED DESIGN FOR SILO SUPERSTRUCTURES, EQUIPMENT ROOMS, AND EQUIPMENT ENCLOSURES FOR SILOS 1, 2, AND 3.
- DESIGN OF THE RESIDUE RETRIEVAL SYSTEMS INCLUDING SILO 1 AND 2 CONTAINMENT INSERT, SILO 3 BACKING PLATES, AND ALL OTHER CONTAINMENT HARDWARE, EQUIPMENT, AND UTILITIES WILL BE COVERED UNDER A SEPARATE SCOPE OF WORK.

INDEX OF DRAWINGS

INDEX CODE NO.	DRAWING NO.	SHEET NO.	REVISION NO.	PROJECT TITLE SHEET	DRAWING TITLE	REMARKS
	94X-5900-X-00967	X0001	C	PROJECT TITLE SHEET		
	94X-5900-X-00968	X0002	C	DRAWING INDEX		
	94X-5900-X-00969	X0003	C	LEGEND AND SYMBOLS		
	94X-5900-G-00970	G0001	C	CIVIL - SITE/UTILITY PLAN		
	94X-5900-G-00971	G0002	C	CIVIL - GRADING PLAN		
	94X-5900-G-00973	G0003	C	CIVIL - DETAILS - SHEET 1 OF 2		
	94X-5900-G-00974	G0004	C	CIVIL - DETAILS - SHEET 2 OF 2		
	94X-5900-G-00975	G0005	C	CIVIL - UTILITY PROFILE		
	94X-5900-A-00976	A0001	C	ARCHITECTURAL - PLANS AND INTERIOR ELEVATION - SILO 1 AND 2 EQUIPMENT ROOM		
	94X-5900-A-00992	A0002	C	ARCHITECTURAL - ELEVATIONS - SILO 1 AND 2 EQUIPMENT ROOM		
	94X-5900-A-00977	A0003	C	ARCHITECTURAL - SECTIONS AND DETAILS - SILO 1 AND 2 EQUIPMENT ROOM		
	94X-5900-A-00978	A0004	C	ARCHITECTURAL - SCHEDULES AND DETAILS - SILO 1 AND 2 EQUIPMENT ROOM		
	94X-5900-S-00979	S0001	C	STRUCTURAL - KEY PLAN - SILO 1 AND 2 SUPERSTRUCTURE		
	94X-5900-S-00980	S0002	C	STRUCTURAL - ENLARGED PLAN - SILO 1 AND 2 TOP CHORD		
	94X-5900-S-00981	S0003	C	STRUCTURAL - ENLARGED PLAN - SILO 1 AND 2 BOTTOM CHORD		
	94X-5900-S-00982	S0004	C	STRUCTURAL - ENLARGED PLAN - SILO 1 AND 2 EQUIPMENT ROOM		
	94X-5900-S-00983	S0005	C	STRUCTURAL - ENLARGED PLAN - SILO 1 AND 2 EQUIPMENT ROOM		
	94X-5900-S-00984	S0006	C	STRUCTURAL - PLAN AND DETAILS - SILO 1 AND 2 DOME SEGMENT REMOVAL		
	94X-5900-S-00985	S0007	C	STRUCTURAL - ELEVATION - SILO 1 AND 2 TRUSS		
	94X-5900-S-00986	S0008	C	STRUCTURAL - ELEVATIONS - SILO 1 AND 2 TOWERS AND EQUIPMENT ROOM		
	94X-5900-S-00987	S0009	C	STRUCTURAL - SECTIONS AND DETAILS - SILO 1 AND 2		
	94X-5900-S-00988	S0010	C	STRUCTURAL - SECTIONS AND DETAILS - SILO 1 AND 2		
	94X-5900-S-01024	S0011	A	STRUCTURAL - SECTIONS AND DETAILS - SILO 1 AND 2 SUPERSTRUCTURE		
	94X-5900-S-01025	S0012	A	STRUCTURAL - SECTIONS AND DETAILS - SILO 1 AND 2 SUPERSTRUCTURE		
	94X-5900-S-01027	S0013	A	STRUCTURAL - SECTIONS AND DETAILS - SILO 1 AND 2 SUPERSTRUCTURE		
	94X-5900-S-00989	S0014	C	STRUCTURAL - PLANS, SECTIONS, AND DETAILS - SILO 1 AND 2 STAIRS		
	94X-5900-S-00990	S0015	C	STRUCTURAL - ELEVATIONS AND DETAILS - SILO 1 AND 2 LADDERS		
	94X-5900-S-00991	S0016	C	STRUCTURAL - PLAN AND SECTIONS - SILO 1 AND 2 CONCRETE FOUNDATION		
	94X-5900-S-01009	S0017	C	STRUCTURAL - TRUSS FORCE DIAGRAM - SILO 1 AND 2		
	94X-5900-S-00994	S0018	C	STRUCTURAL - PLANS - SILO 3 EQUIPMENT ENCLOSURE		
	94X-5900-S-00995	S0019	C	STRUCTURAL - ELEVATIONS - SILO 3 EQUIPMENT ENCLOSURE		
	94X-5900-S-00996	S0020	C	STRUCTURAL - SECTIONS AND DETAILS - SILO 3 EQUIPMENT ENCLOSURE		
	94X-5900-S-00997	S0021	C	STRUCTURAL - PLAN, SECTIONS, AND DETAILS - SILO 3 EQUIPMENT ENCLOSURE CONCRETE FOUNDATION		
	94X-5900-S-01007	S0022	C	STRUCTURAL - SECTIONS AND DETAILS - SILO 3 EQUIPMENT ENCLOSURE		

REF	DWG NO.	DRAWING TITLE
94X-5900-X-00967		PROJECT TITLE SHEET
94X-5900-X-00969		LEGEND AND SYMBOLS

PRELIMINARY  
NOT FOR CONSTRUCTION

C	ISSUED FINAL FOR EPA REVIEW	N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW	N/A
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  
SILO SUPERSTRUCTURE DESIGN  
FOR  
SILOS PROJECT

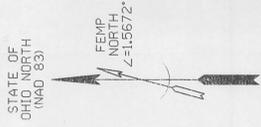
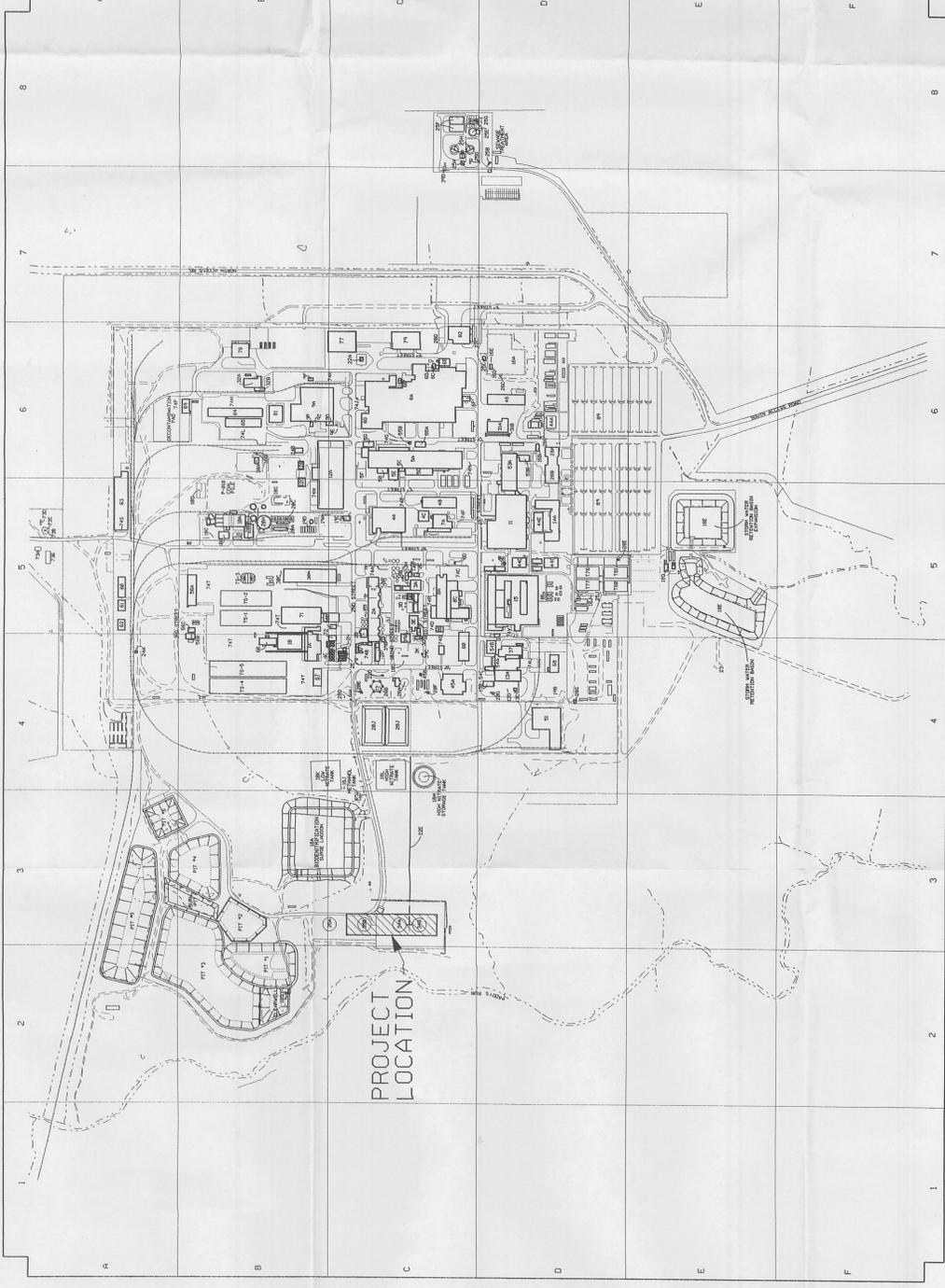
DRAWING TITLE  
DRAWING INDEX  
INFORMATION ONLY  
160

DRAWN BY K.L. RABBITT	DATE 02/13/96	LEAD ENGINEER A.W. SCHATZ	DATE 04/05/96
PLANT/BLDG. NO.	FLOOR	SCALE	CLASS
SUBMITTED FOR APPROVAL	FERNALD CRU APPROVAL	NONE	PROJECT NO. 40200

DATE 00-90701	DATE 94X-5900-X-00968	DATE X0002
PROJECT NO. WSS 1111.4.3.2	DRAWING INDEX CODE NO.	SHEET NO.

# UNITED STATES DEPARTMENT OF ENERGY FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

## SILO SUPERSTRUCTURE DESIGN SILOS PROJECT OPERABLE UNIT 4 - PROJECT ORDER 161



PARSONS  
The Ralph M. Parsons Company \* Parsons Main, Inc. \* Engineering-Science, Inc.  
ARCHITECTS - ENGINEERS  
CINCINNATI, OHIO

NOTES

392

REF DWG NO.	DRAWING TITLE
94X-5900-X-00968	DRAWING INDEX
94X-5900-X-00969	LEGEND AND SYMBOLS

PRELIMINARY  
NOT FOR CONSTRUCTION

C	ISSUED FINAL FOR EPA REVIEW	N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW	N/A
A	ISSUED FOR 90% DESIGN REVIEW	N/A
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E FERMNO DATE INITIALS AND DATE

UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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

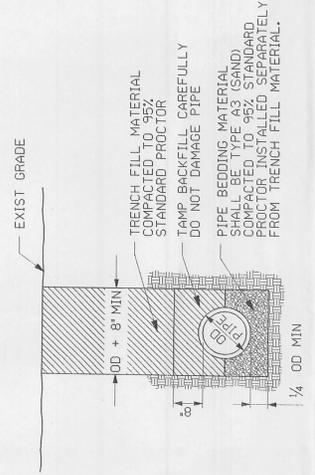
PROJECT NAME  
SILOS PROJECT  
DRAWING TITLE

PROJECT TITLE SHEET  
ONLY  
159

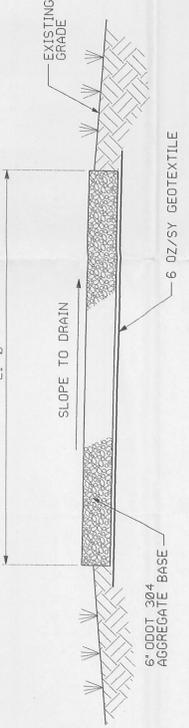
DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
K.L. RABBITT	02/13/96	A.M. SCHATZ	04/05/96	A.M. SCHATZ	04/05/96
PLANT/BUILD. NO.	FLOOR	SCALE	CLASS	NONE	
SUBMITTED FOR APPROVAL	FERMNO. CRU APPROVAL	N/A	PROJECT NO.	40200	
A-E DATE	DATE	DRAWING INDEX CODE NO.	SHEET NO.	RECT. NO.	
00-90701	WBS 1.1.1.1.4.3.2	94X-5900-X-00967	X0001	C	

PREPARED UNDER PARSONS PROJECT ORDER NUMBER  
004/P0161

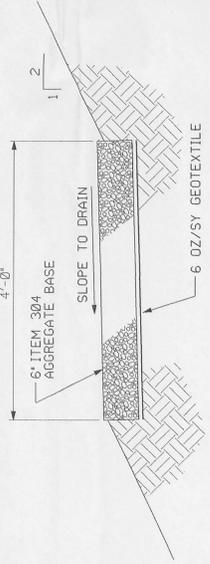
- UNLESS OTHERWISE NOTED, ALL MATERIALS SHALL CONFORM TO THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION (ODOT) CONSTRUCTION AND MATERIAL SPECIFICATIONS DATED JANUARY 1, 1995.
- SEDIMENT FENCE SIMILAR TO MIRAFI PREFABRICATED SILT FENCE WITH 10" DRAIN AND 1/4" WIDE HIGH-STRENGTH INDUSTRIAL BELT LACED THROUGH A HEAVILY REINFORCED TOP EDGE.



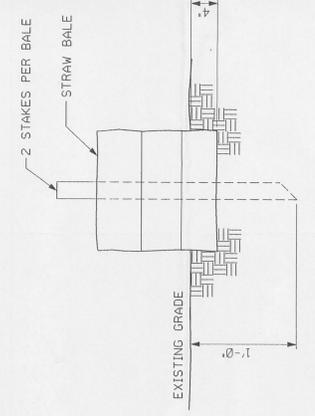
TYPICAL PIPE BEDDING DETAIL  
NTS



TYPICAL GRAVEL PAVING DETAIL  
NTS

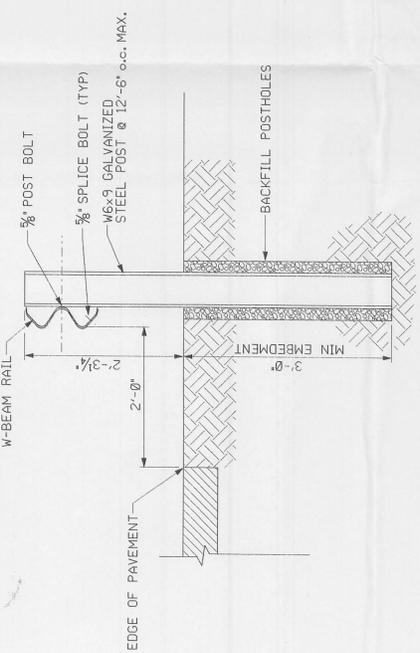


DETAIL 3 REF 600973 600976  
GRAVEL WALKWAY  
NTS



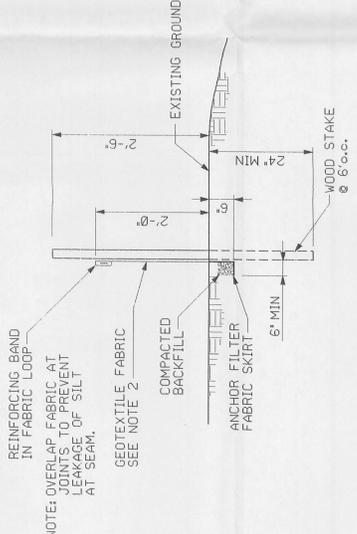
- NOTE:
- STRAW BALES TO BE USED WHEN NATURAL GROUND IS LEVEL OR SLOPING AWAY FROM PROJECT.
  - PLACE STRAW BALES APPROXIMATELY PARALLEL TO BOTTOM OF FILL SLOPE AND AROUND THE CATCH BASIN INLETS.
  - STRAW BALES SHALL BE STANDARD SIZE 18"x18"x48".
  - FOR EROSION CONTROL MAINTENANCE SEE SPECIFICATIONS.

TYPICAL STRAW BALE BARRIER DETAIL  
NTS

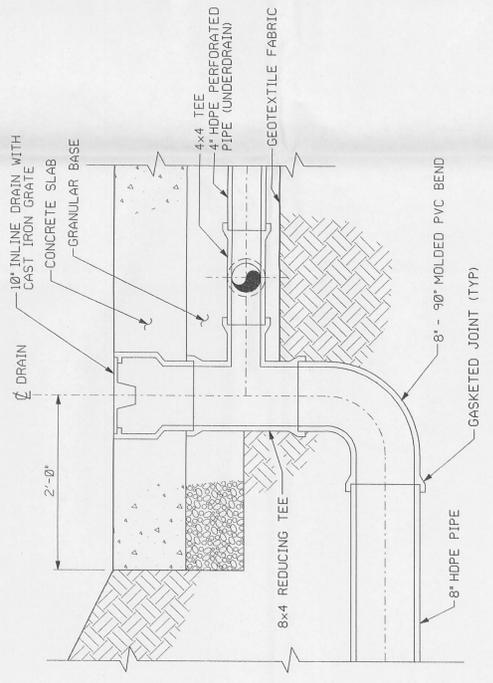


NOTE: ALL MATERIAL SHALL BE IN ACCORDANCE WITH APPLICABLE ODOT STANDARDS AND SPECIFICATIONS

DETAIL 1 REF 600973 600976  
NTS



TYPICAL SEDIMENT FENCE DETAIL  
NTS



DETAIL 2 REF 600973 600975  
NTS

PRELIMINARY  
NOT FOR CONSTRUCTION

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

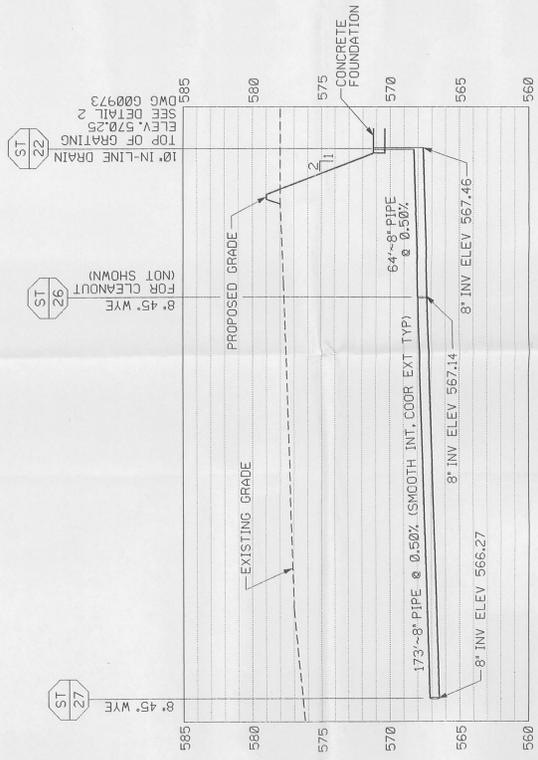
UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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

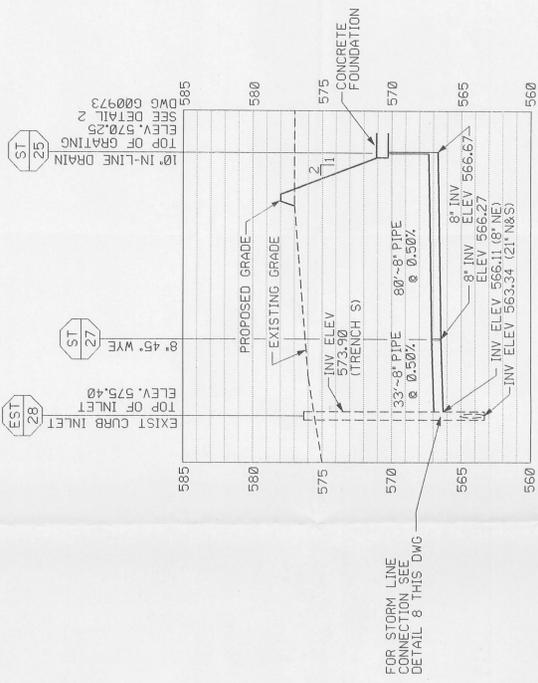
PROJECT NAME  
**SILLO SUPERSTRUCTURE DESIGN**  
DRAWING TITLE  
**SILLOS PROJECT**

FOR INFORMATION ONLY	DATE	SCALE	CLASS
CIVIL	04/03/96		
DETAILS			
SHEET 1 OF 2			
DRAWN BY	DATE	LEAD ENGINEER	CHECKED BY
D.R. FOX	03/22/96	E. KUBRIN	
PLANT/BUILDING NO.	FLOOR		
SUBMITTED FOR APPROVAL	DATE	FERMCO CRU APPROVAL	FERMCO PROJECT NO.
		N/A	40200

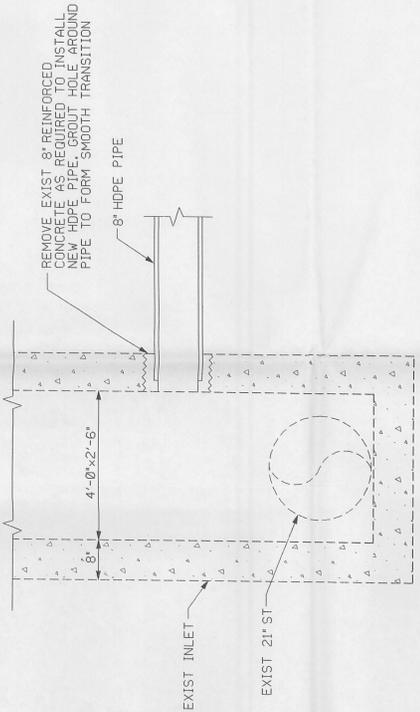
PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DATE	DRAWING INDEX CODE NO.	SHEET NO.
004/P0161	00-90701	94X-5900-G-00973	00003
			C



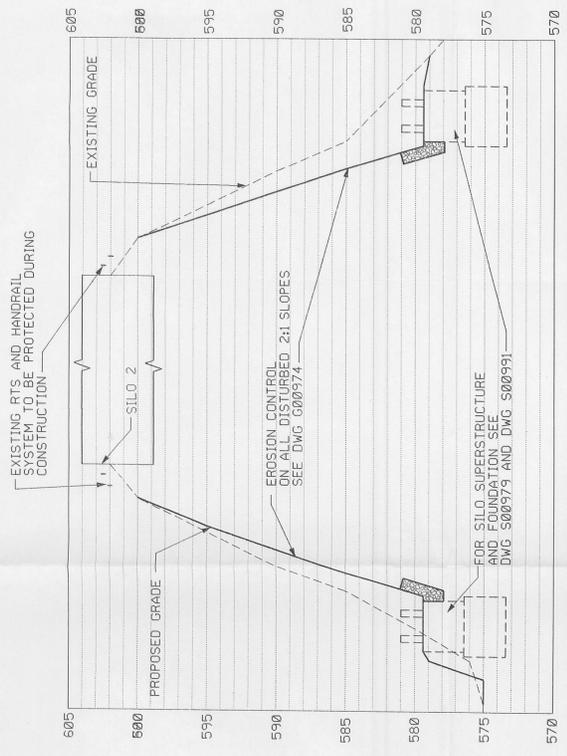
STORM SEWER (ST) PROFILE 1 REF 600975 600970  
SCALE: HOR 1"=30' VER 1"=5'



STORM SEWER (ST) PROFILE 2 REF 600975 600970  
SCALE: HOR 1"=30' VER 1"=5'



STORM LINE CONNECTION DETAIL 8 NTS



SECTION A REF 600975 600971  
SCALE: HOR 1"=30' VER 1"=5'

PRELIMINARY  
NOT FOR CONSTRUCTION

REF DWG NO.	DRAWING TITLE
94X-5900-X-00968	DRAWING INDEX
94X-5900-X-00969	LEGEND AND SYMBOLS
94X-5900-G-00970	SITE/UTILITY PLAN
94X-5900-G-00973	DETAILS - SHEET 1 OF 2

C	ISSUED FINAL FOR EPA REVIEW	N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW	N/A
A	ISSUED FOR 30% DESIGN REVIEW	N/A
REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E, PERM, DATE 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  
SILO SUPERSTRUCTURE DESIGN FOR SILOS PROJECT

DRAWING TITLE  
CIVIL UTILITY PROFILE

PROJECT NO.  
40200

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
D.P. FOX	02/29/96	E. KUBBRIN	04/02/96		
PLANT/BLDG. NO.		FLOOR		SCALE	CLASS
SUBMITTED FOR APPROVAL		PERMITS CRU APPROVAL		AS NOTED	PROJECT NO.
					40200

PREPARED UNDER PARSONS PROJECT ORDER NUMBER	DATE	TEMP PROJECT NO.	DRAWING REVISION NO.	SHEET NO.	TOTAL SHEETS
004/P0161	M/S 1.11.14.2	00-90701	94X-5900-G-00975	00005	C







- FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-00979.
- CONSTRUCTION NOTES:
  - EACH MODULE SHALL BE CONSTRUCTED OFF SITE AND SHIPPED TO THE SITE FOR ERECTION. THE SIZE OF EACH MODULE SHALL BE LIMITED TO APPROXIMATE OVERALL DIMENSIONS OF 14' HIGH BY 24' WIDE BY 70' LONG BASED ON TRUCKING COMPANY SIZE AND RESTRICTIONS. THE FABRICATOR SHALL PROVIDE ADDITIONAL INFORMATION ON THE MODULOSHIPPERING AND TRANSPORTATION. THE FOLLOWING NOTATIONS SHALL BE USED TO IDENTIFY THE MODULES: SEE DRAWING 94X-5900-S-00979 FOR LOCATION.
  - PORTIONS OF THE MAIN TRUSS MODULES INCLUDING CHORDS, DIAGONALS, FLOOR PLATE, AND CHECKERED FLOOR PLATE AND CHECKERED FLOOR PLATE AND CHECKERED FLOOR PLATE SHALL BE CUT AROUND ALL MEMBERS THAT PENETRATE THE PLATES.
  - CLEANING PLATFORMS TO ACCESS THE FOUR OUTER YANWAYS.
  - MONORAIL SUPPORT - EAST END ON TOP OF TRUSS.
  - DOVE CUTTING ENCLOSURE UNDER TRUSS. SUPPORT STEEL FOR DOVE SEGMENT REMOVAL BY DOVE CUTTING VENDOR.
  - WALKWAY ATTACHMENTS TO THE MAIN TRUSS.
  - BRACING ATTACHMENT TO END TOWERS EQUIPMENT ROOM ENCLOSURE WEST END BETWEEN CENTERLINES A.1 AND A.9.
  - EQUIPMENT ROOM ENCLOSURE CENTER BETWEEN CENTERLINES A.1 AND A.9.
  - EQUIPMENT ROOM ENCLOSURE EAST END BETWEEN CENTERLINES A.1 AND A.9.
  - EQUIPMENT ROOM ENCLOSURE VESTIBULE BETWEEN CENTERLINES A.1 AND A.9.
  - SUPPORT TOWERS WEST AND EAST FROM FOUNDATION TO BOTTOM OF TRUSS. STAIRS AND LADDERS INCLUDED.
  - BOLETTED CONNECTIONS SHALL BE PROVIDED FOR EACH ONE MODULE TO THE OTHER USING ONE MODULE NOTED ON THE DRAWINGS. SOME FIELD WELDING MAY BE REQUIRED TO CONNECT MODULES THAT HAVE COMMON MEMBERS. FIELD WELDING SHOULD BE MINIMIZED.

- MODULES INCLUDE ALL HANDRAILS, POSTS, FLOOR PLATES AND STAIRS.

CONTINUED ON DRAWING 94X-5900-S-00981.

REF DWG NO.	DRAWING INDEX	DRAWING TITLE
94X-5900-X-00968	DRAWING INDEX	
94X-5900-X-00969	LEGEND AND SYMBOLS	
94X-5900-S-00979	KEY PLAN	
94X-5900-S-00981	SILLO 1 AND 2 BOTTOM CHORD	
94X-5900-S-00987	SECTIONS AND DETAILS	
94X-5900-S-00988	SECTIONS AND DETAILS	
94X-5900-S-01027	SECTIONS AND DETAILS	

**PRELIMINARY**  
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	DATE	INITIALS AND DATE
C	ISSUED FINAL FOR EPA REVIEW		N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW		N/A
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  
**SILLO SUPERSTRUCTURE DESIGN**

DRAWING TITLE  
**STRUCTURAL ENLARGED PLAN SILLO 1 AND 2 TOP CHORD**

DATE  
4/8/96

CHECKED BY  
R.B. JADHAV/ALRM

SCALE  
1/4"=1'-0"

CLASS  
40200

DATE  
00-90701

PROJECT NO.  
94X-5900-S-00980

DRAWING INDEX CODE NO.  
S0002 C

SHEET NO.  
004/P0161

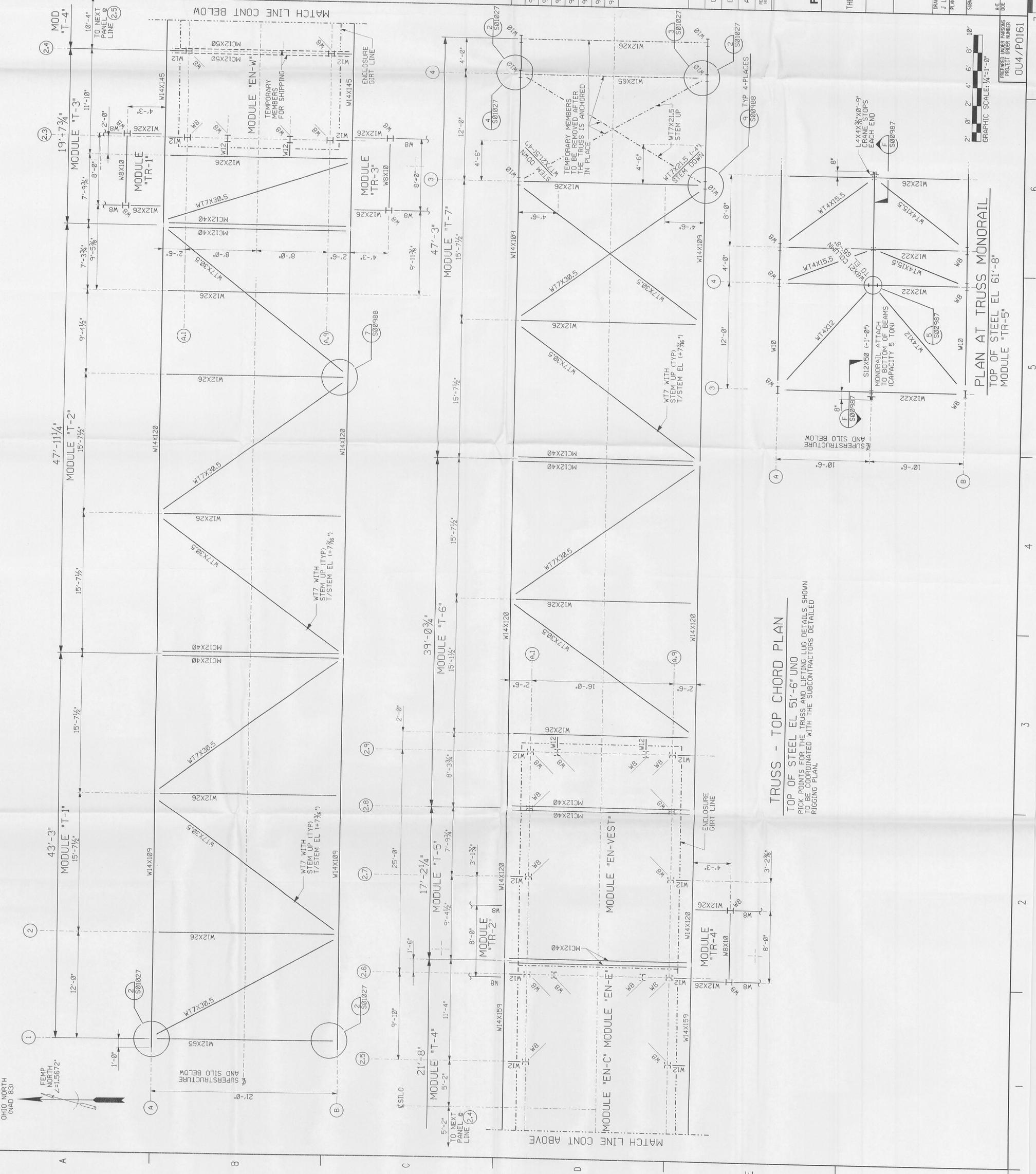
GRAPHIC SCALE: 1/4"=1'-0"

TRUSS - TOP CHORD PLAN

TOP OF STEEL EL 51'-6" UNO  
PICK POINTS FOR THE TRUSS AND LIFTING LUG DETAILS SHOWN  
TO BE COORDINATED WITH THE SUBCONTRACTORS DETAILED  
RIGGING PLAN.

PLAN AT TRUSS MONORAIL  
TOP OF STEEL EL 61'-8"  
MODULE "TR-5"

ENCLOSURE GIRTS BELOW





1. FOR DOOR LOCATIONS, SEE DRAWING 94X-5900-A-00976.

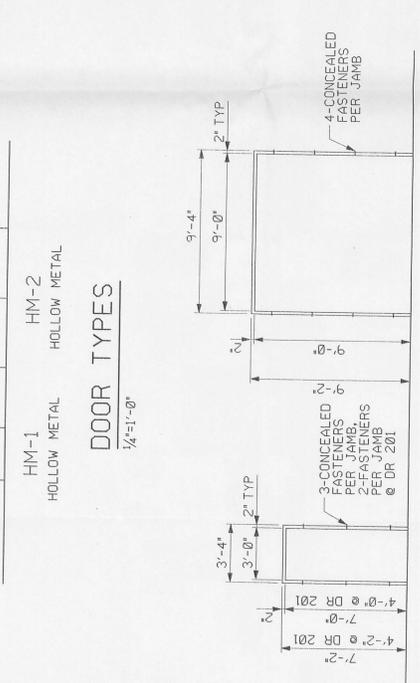
DOOR SCHEDULE

DOOR NO.	LOCATION	DOOR		GLASS		FRAME			FIRE RATING	REMARKS			
		THKNS	OPENING	TYPE	SIZE	TYPE	MAT	HEAD			JAMB	SILL	
101	EQUIPMENT ROOM	1 1/2"	3'-0"X7'-0"	HM	10'X10"	SAFETY	HM	F-1	H-1	J-1	S-1	HW-4	EMERGENCY EGRESS ONLY
102	VESTIBULE	1 1/2"	2'-0"X7'-0"	HM	10'X10"	SAFETY	HM	F-1	H-1	J-1	S-1	HW-1	
103	EQUIPMENT ROOM	1 1/2"	PR. 4'-6"X3'-0"	HM	10'X10"	SAFETY	HM	F-2	H-1	J-1	S-2	HW-5	PROVIDE ASTRAGAL WITH WEATHERSTRIP
104	VESTIBULE	1 1/2"	3'-0"X7'-0"	HM	10'X10"	SAFETY	HM	F-1	H-1	J-1	S-1	HW-1	
105	VESTIBULE	1 1/2"	PR. 4'-6"X3'-0"	HM	10'X10"	SAFETY	HM	F-2	H-1	J-1	S-2	HW-2	PROVIDE ASTRAGAL WITH WEATHERSTRIP
201	DOVE CUTTG ENCLOSURE	1 1/2"	3'-0"X4'-0"	HM	NONE	NONE	HM	F-1	H-2	J-2	S-3	HW-3	

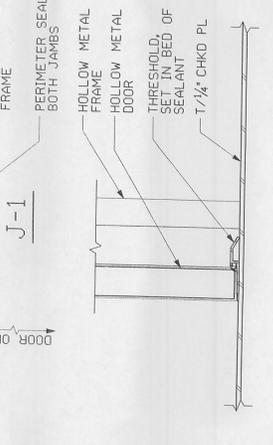
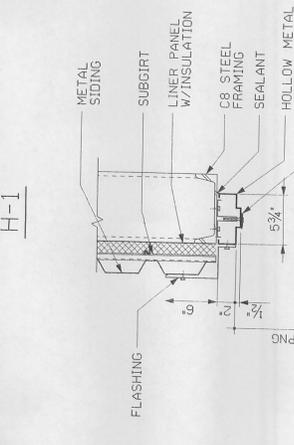
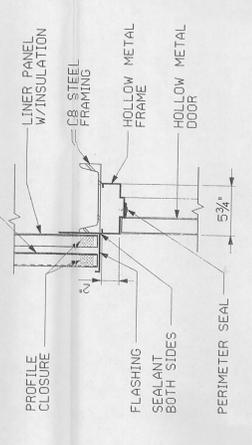
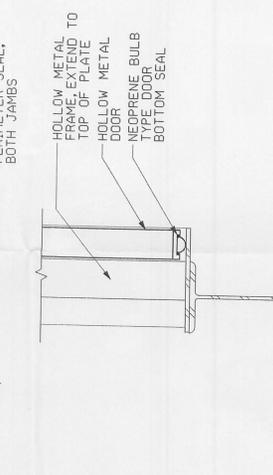
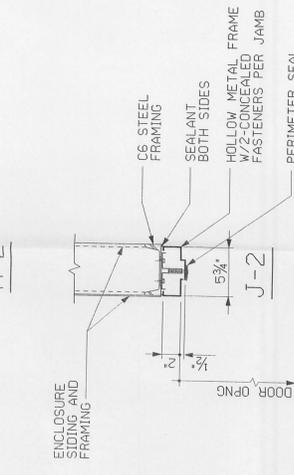
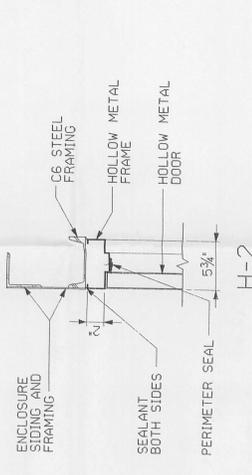
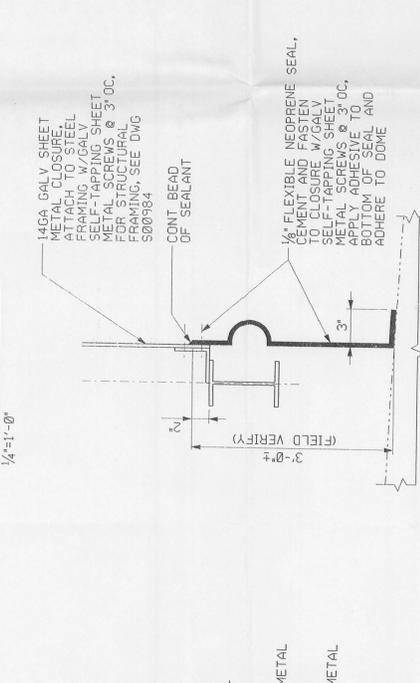
ROOM FINISH SCHEDULE

NO.	NAME	FLOOR	WALL	CEILING	REMARKS
101	EQUIPMENT ROOM	GRATING	INSULATION EXTERIOR SIDING OF EQUIPMENT ROOM	PAINT EXPOSED STRUCTURE	CEILING HEIGHT
102	VESTIBULE	•	•	•	VARIES
201	EQUIPMENT ROOM	•	•	•	VARIES

DOOR TYPES



FRAME TYPES



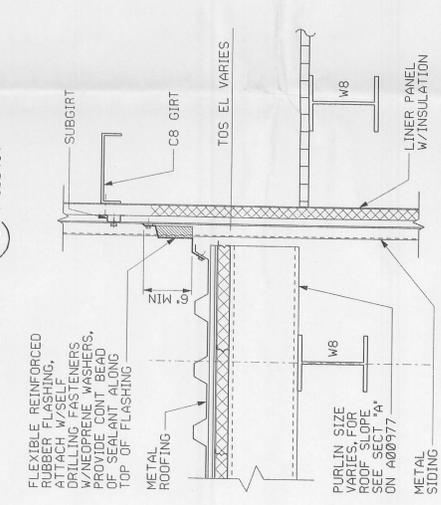
S-2  
3/4"=1'-0"

S-1  
3/4"=1'-0"

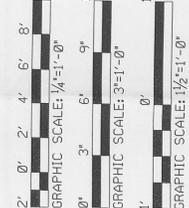
HEAD, JAMB, AND SILL DETAILS

1/2"=1'-0" (UNLESS NOTED OTHERWISE)

DETAIL 1



SECTION E



PRELIMINARY  
NOT FOR CONSTRUCTION

REF	DWG NO.	DRAWING TITLE
94X-5900-X-00968		DRAWING INDEX
94X-5900-X-00969		LEGEND AND SYMBOLS
94X-5900-A-00976		PLANS AND INTERIOR ELEVATION
94X-5900-A-00977		SECTIONS AND DETAILS
94X-5900-A-00992		ELEVATIONS
94X-5900-S-00984		PLAN AND DETAILS SILO 1 AND 2, DOME SEGMENT REMOVAL

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	DATE
C	ISSUED FINAL FOR EPA REVIEW	N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW	N/A
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  
**SILLO SUPERSTRUCTURE DESIGN**

DRAWING TITLE  
**SILLO SUPERSTRUCTURE DESIGN**

ARCHITECTURAL SCHEDULES AND DETAILS  
SILO 1 AND 2 EQUIPMENT ROOM

DATE: 02/08/96  
DRAWN BY: K.L. RABBITT  
CHECKED BY: A.M. SCHATZ  
SCALE: AS NOTED

DATE: 02/08/96  
SUBMITTED FOR APPROVAL: [Signature]  
DATE: 02/08/96  
DATE: 02/08/96  
SCALE: AS NOTED

PROJECT NO.: 40200

DATE: 02/08/96  
DRAWING INDEX CODE NO.: 00-90701  
SHEET NO.: 94X-5900-A-00978 (A0004)

PREPARED UNDER PARSONS PROJECT ORDER NUMBER  
DU4/P0161

DATE: 02/08/96  
SCALE: AS NOTED  
PROJECT NO.: 40200  
SHEET NO.: 94X-5900-A-00978 (A0004)

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

REF. DWG. NO.	DRAWING TITLE
94X-5900-X-00968	DRAWING INDEX
94X-5900-X-00969	LEGEND AND SYMBOLS
94X-5900-S-00982	ENLARGED PLANS FOR EQUIPMENT ROOM
94X-5900-S-00984	PLAN AND DETAILS FOR SILO 1 AND 2 DOME SEGMENT REMOVAL
94X-5900-S-00986	ELEVATIONS FOR SILO 1 AND 2 TOWERS AND EQUIPMENT ROOM
94X-5900-A-00976	PLANS
94X-5900-A-00992	ELEVATIONS

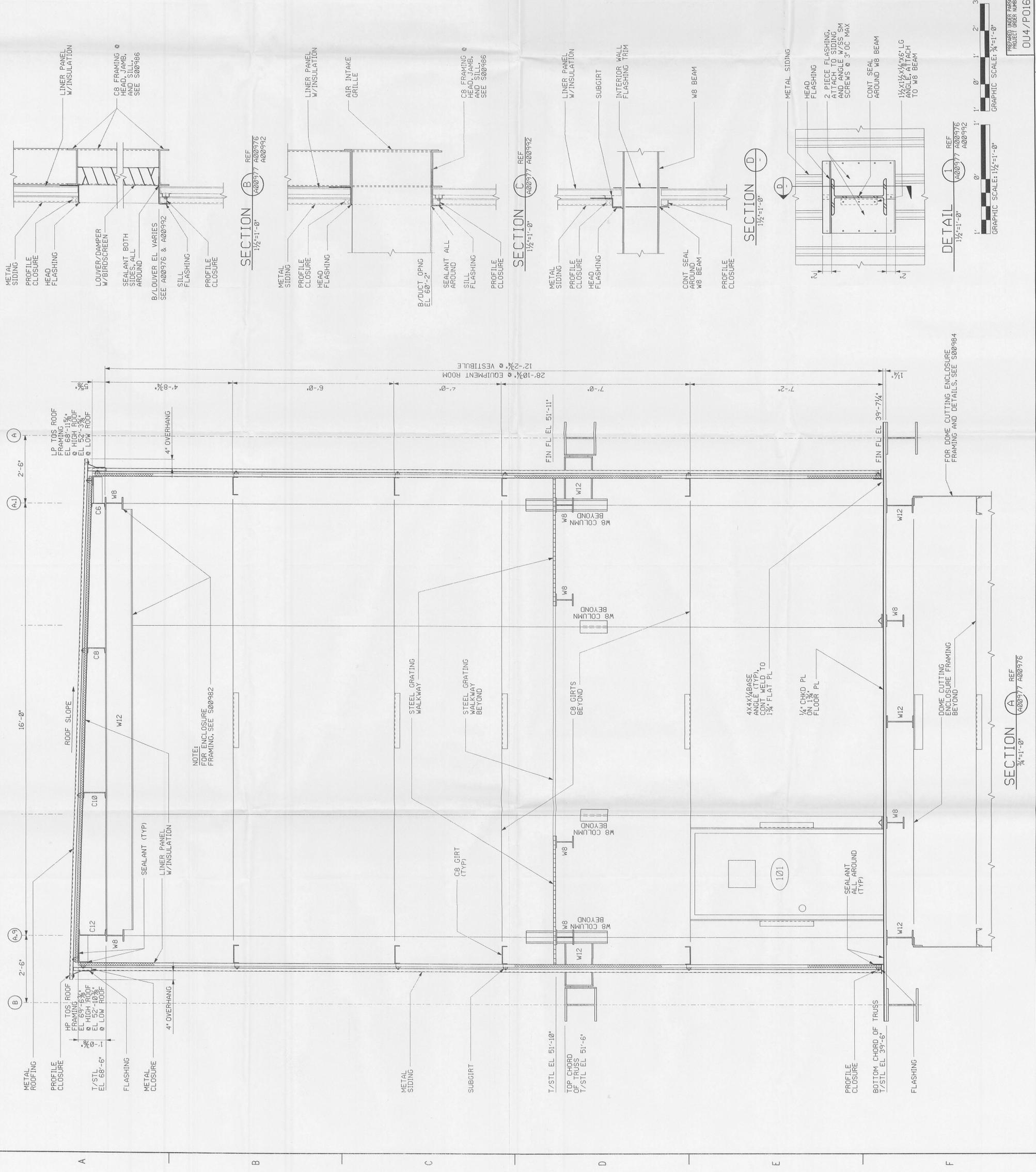
PRELIMINARY  
NOT FOR CONSTRUCTION

**UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

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

PROJECT NAME  
**SILLO SUPERSTRUCTURE DESIGN**

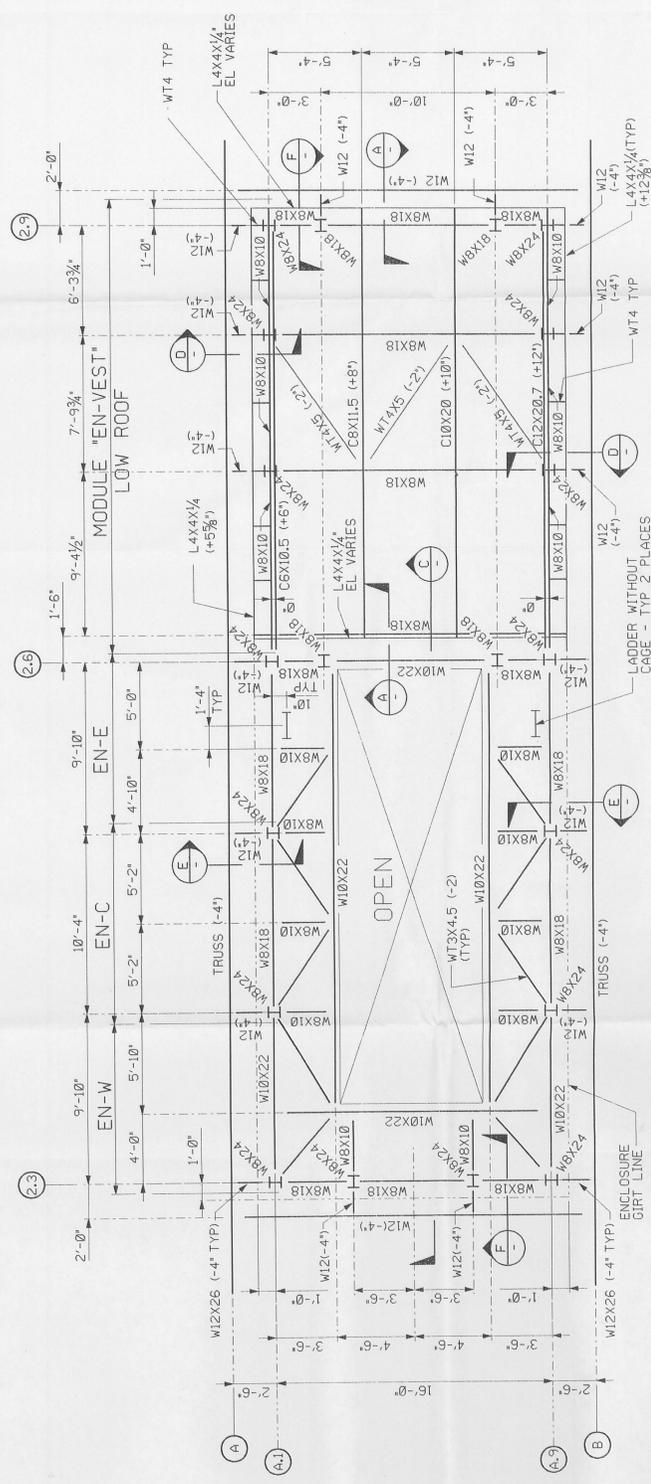
DRAWING TITLE		DATE	
SILLO PROJECT		04/04/96	
ARCHITECTURAL SECTIONS AND DETAILS FOR SILLO 1 AND 2 EQUIPMENT ROOM		02/08/96	
DRAWN BY	DATE	CHECKED BY	DATE
K.L. RABBITT	02/08/96	A.W. SCHATZ	04/04/96
PLANT/REV. NO.	FLOOR	SCALE	AS NOTED
SUBMITTED FOR APPROVAL		DATE	
		00-90701	
DATE		DRAWING INDEX CODE NO.	
00-90701		94X-5900-A-00977	
PROJECT NO.		SHEET NO.	
40200		A0003	



**SECTION A**  
1/2"=1'-0"

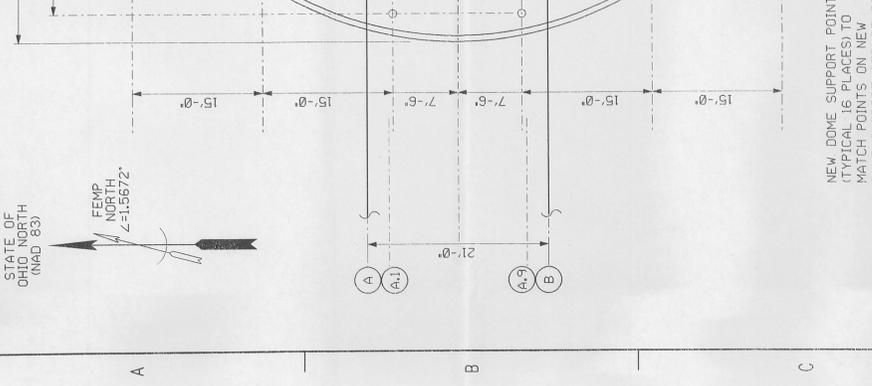
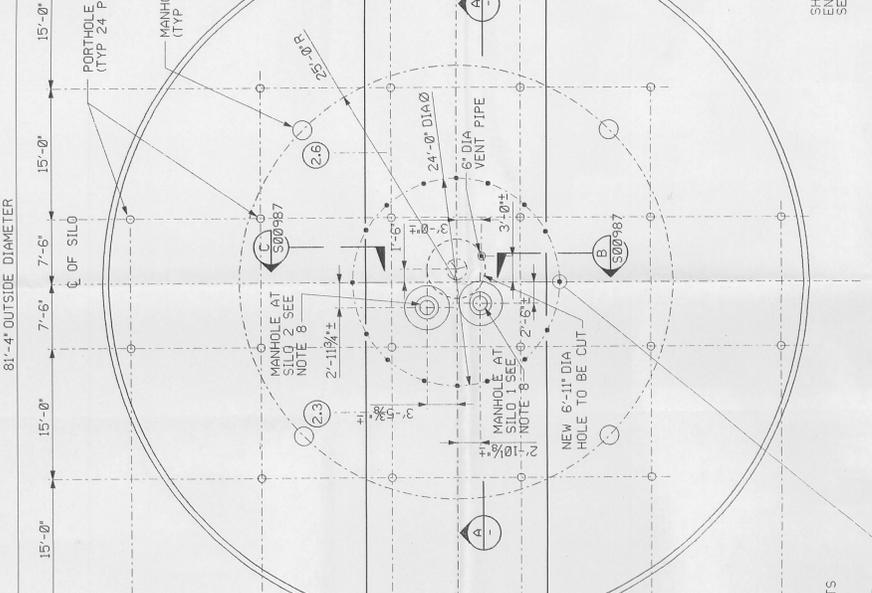
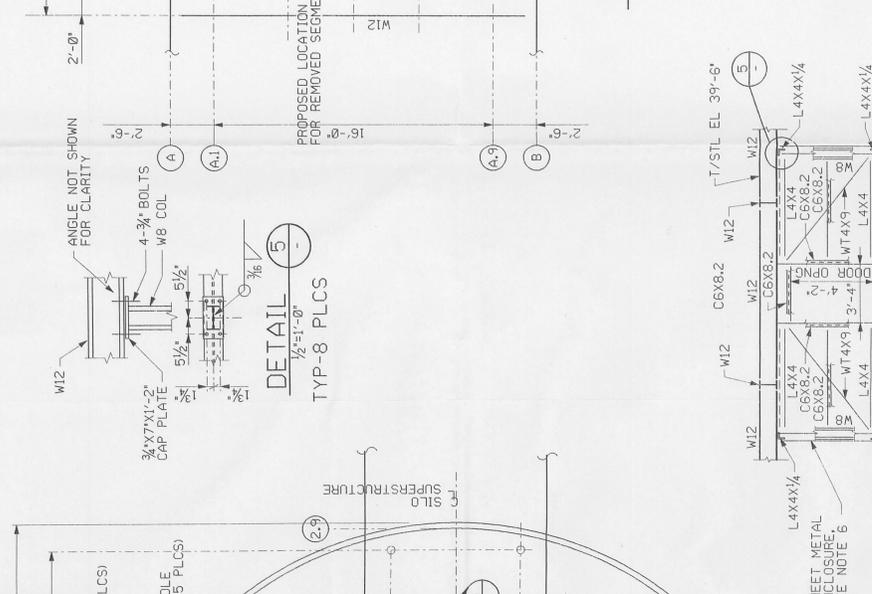
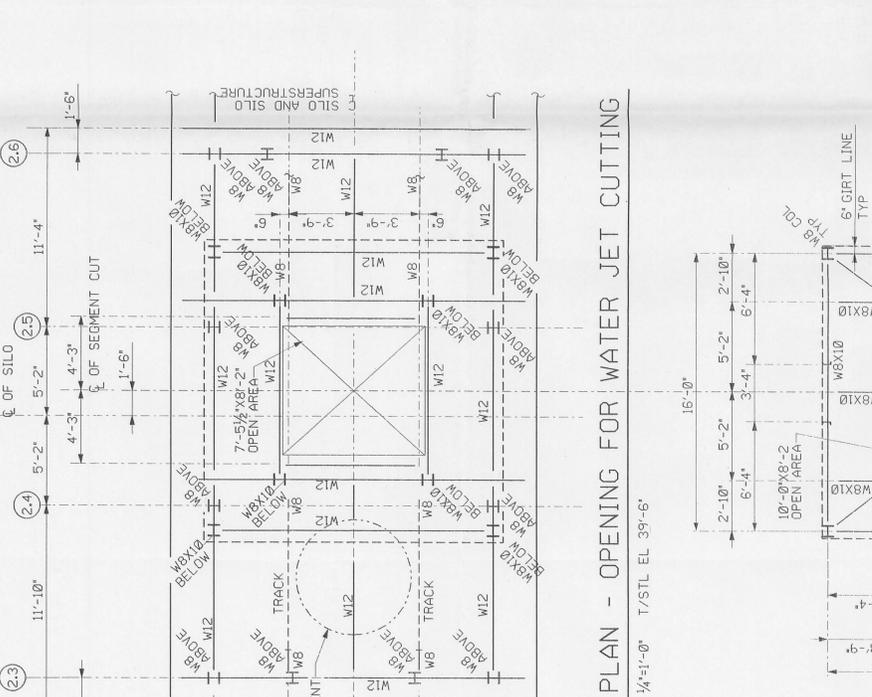
PREPARED UNDER PROVISIONS  
OF THE ARCHITECTURAL  
PROJECT ORDER NUMBER  
**OU4/P0161**

STATE OF OHIO  
NORTH  
MAD 63)  
FEMP  
NORTH  
L=1.5672'



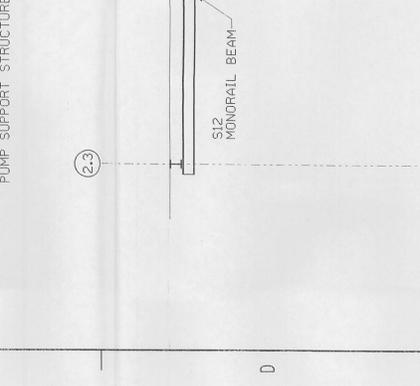
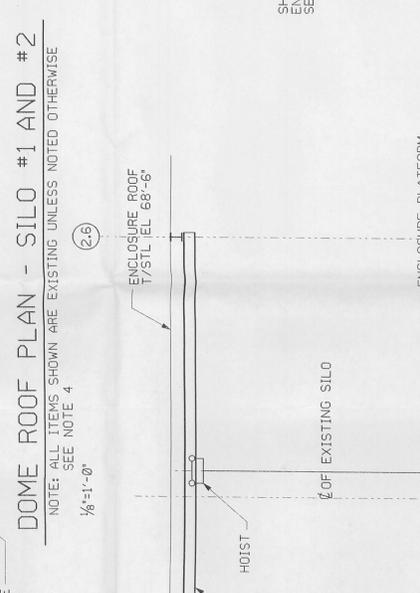
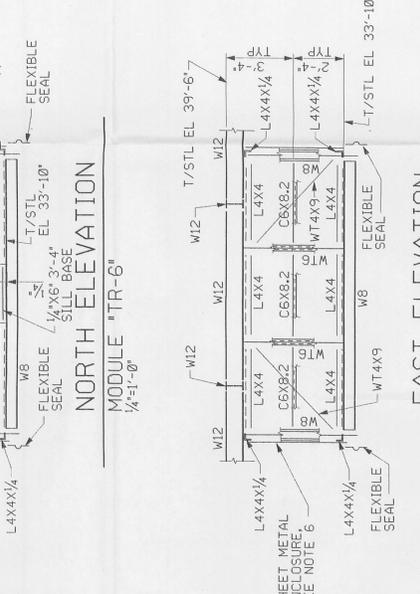


- FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-000979.
- FOR PLAN AT TRUSS BOTTOM CHORD (TOP OF STEEL EL 39'-6"), SEE DRAWING 94X-5900-S-000981 AND 94X-5900-S-000983.
- SLACK WIRE ROPE AND ATTACHMENTS ARE DESIGNED TO SUPPORT 30" DIAMETER OF DOME.
- ALL DIMENSIONS FOR EXISTING SILO FEATURES SHOWN ARE APPROXIMATE.
- ALL WORK TO BE DONE BY SUBCONTRACTOR UNLESS NOTED OTHERWISE.
- 14 GAGE GALVANIZED SHEET METAL CLOSURE WITH 1" LAP BETWEEN SECTIONS AND 2" LAP AT CORNERS. ATTACH WITH SELF TAPPING GALVANIZED SHEET METAL SCREWS AT 3" ON CENTER, EACH WAY. PROVIDE CONTINUOUS BEAD OF SEALANT BETWEEN CLOSURE AND FRAMING AND AT ALL EXTERIOR SHEET METAL SEAMS.
- THE DOME CUTTING ENCLOSURE FRAMING SHALL BE FABRICATED AS A SEPARATE MODULE (TR-6) FOR SHIPMENT AND FIELD ATTACHING TO THE TRUSS BOTTOM CHORD FRAMING, BEFORE ERECTION.
- SILO MANWAY ELEVATIONS USED ARE AS SURVEYED BY B. L. RAYNE IN MARCH 1996. SEE DRAWING 94X-5900-S-000978 FOR COORDINATES AND ELEVATIONS. ELEVATION OF 31'-8" WAS USED TO PROVIDE MINIMUM 1'-6" CLEARANCE FOR SILO SUPERSTRUCTURE FROM HIGHEST POINT ON MANWAYS TO THE BOTTOM OF STEEL (ANTICIPATED LIVE LOAD DEFLECTION WILL REDUCE THIS CLEARANCE).



REF. DWG. NO.	DRAWING TITLE
94X-5900-X-000968	DRAWING INDEX
94X-5900-X-000969	LEGEND AND SYMBOLS
94X-5900-G-000970	SITE/UTILITY PLAN
94X-5900-A-000978	SCHEDULES AND DETAILS
94X-5900-S-000979	KEY PLAN
94X-5900-S-000981	SILO 1 AND 2 BOTTOM CHORD
94X-5900-S-000983	SILO 1 AND 2 EQUIPMENT ROOM
94X-5900-S-000987	SECTIONS AND DETAILS

ISSUE NO.	DATE	ISSUE OR REVISION PURPOSE - DESCRIPTION	INITIALS AND DATE
C		ISSUED FINAL FOR EPA REVIEW	N/A
B		ISSUED PRE-FINAL FOR EPA REVIEW	N/A
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  
**SILO SUPERSTRUCTURE DESIGN FOR SILOS PROJECT**

DRAWING TITLE  
**STRUCTURAL PLAN AND DETAILS**

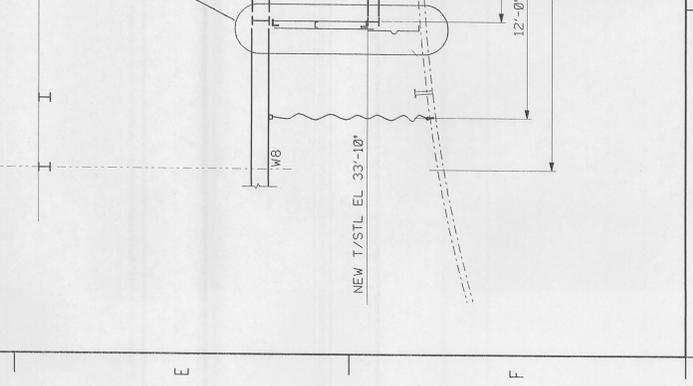
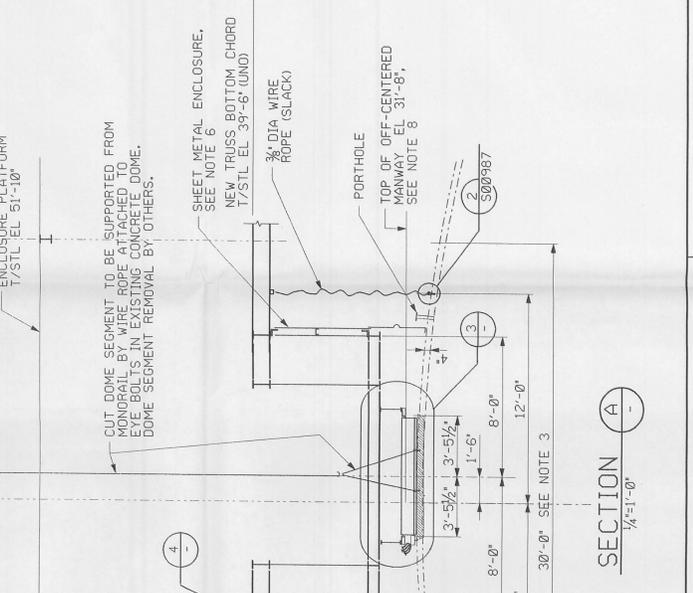
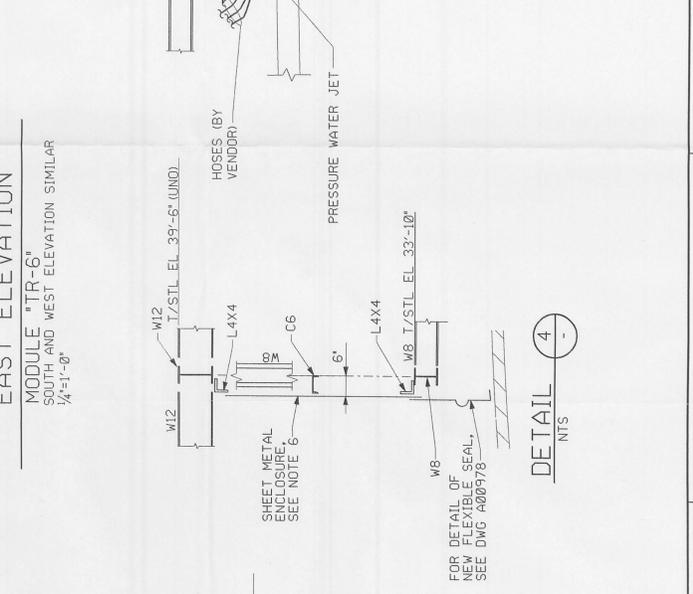
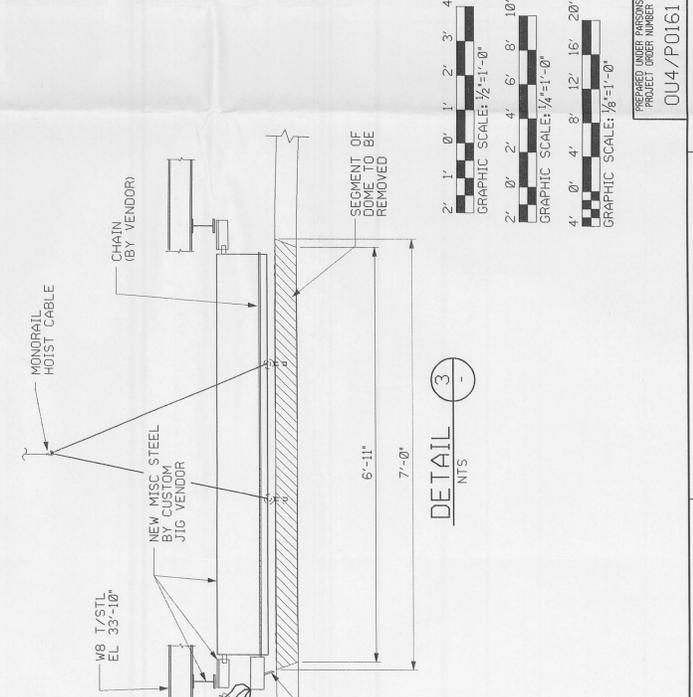
DATE: 2-8-96  
 CHECKED BY: RB JADHAV  
 SCALE: 4-8-96  
 CLASS: 176

DRAWN BY: J LONEY  
 LEAD ENGINEER: RB JADHAV

DATE: 2-8-96  
 CHECKED BY: RB JADHAV  
 SCALE: 4-8-96  
 CLASS: 176

DATE: 2-8-96  
 CHECKED BY: RB JADHAV  
 SCALE: 4-8-96  
 CLASS: 176

DATE: 2-8-96  
 CHECKED BY: RB JADHAV  
 SCALE: 4-8-96  
 CLASS: 176

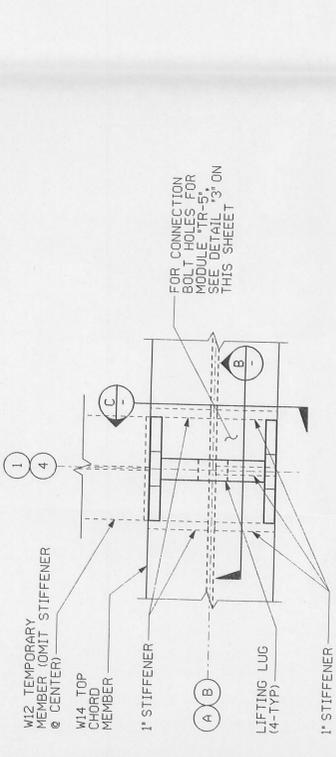




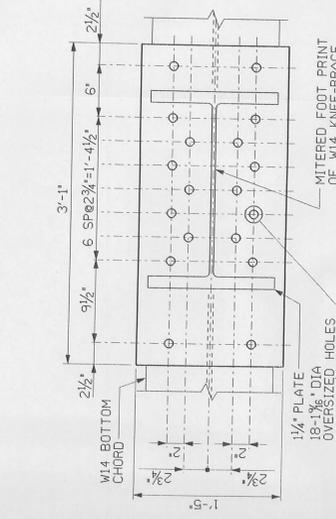




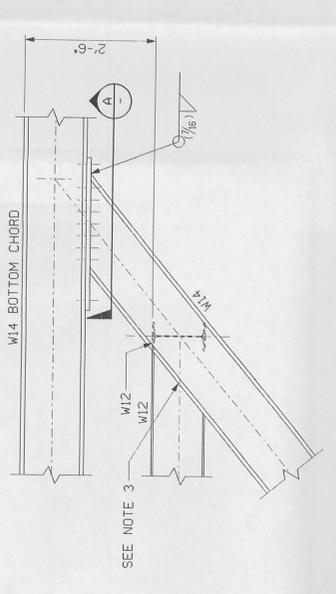
- FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-00979.
- REMOVE LIFTING LUG, SHOWN IN DETAIL 2 ON THIS DRAWING AND GRIND SMOOTH BEFORE INSTALLING MODULE "TR-5" STIFFENER PLATES AT W14, BEAM TO REMAIN.
- ALL CONNECTIONS NOT DETAILED SHALL BE DESIGNED BY FABRICATOR PER NOTE 55 ON DRAWING 94X-5900-S-00979.



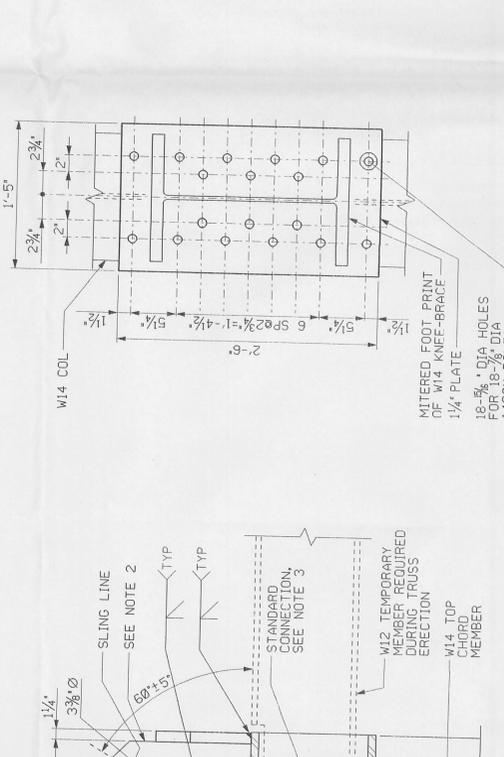
DETAIL 1  
3/4"=1'-0"  
REF S01027 S00986



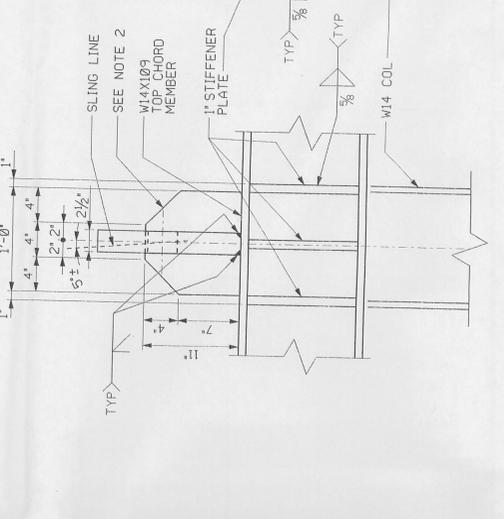
SECTION A  
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REF S01027 S00986



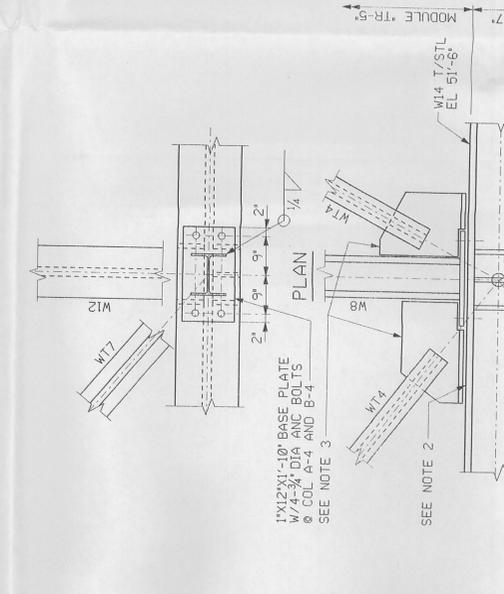
DETAIL 2  
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REF S01027 S00986



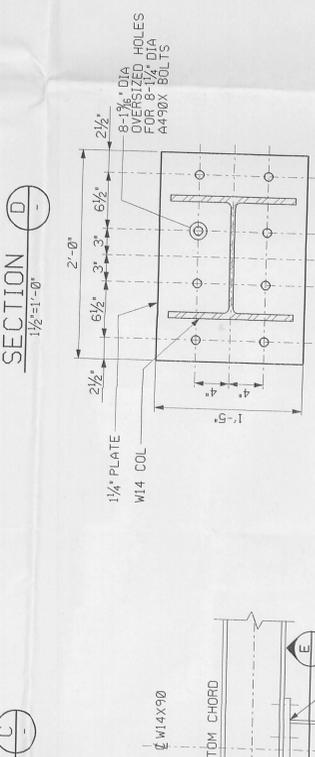
SECTION B  
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REF S01027 S00986



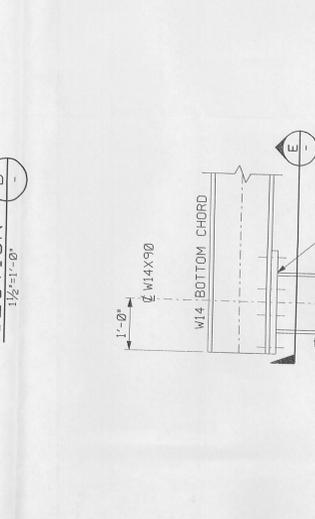
SECTION C  
1/2"=1'-0"  
REF S01027 S00986



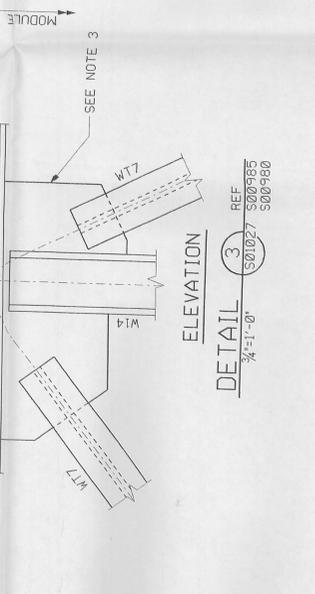
SECTION D  
1/2"=1'-0"  
REF S01027 S00986



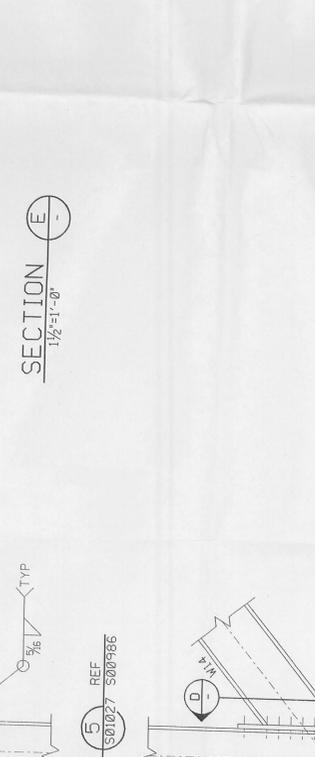
SECTION E  
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REF S01027 S00986



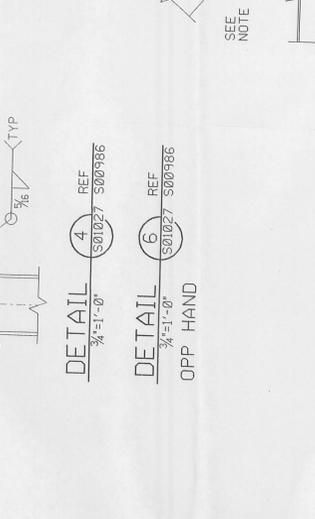
DETAIL 3  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 4  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 5  
3/4"=1'-0"  
REF S01027 S00986



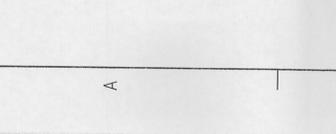
DETAIL 6  
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REF S01027 S00986



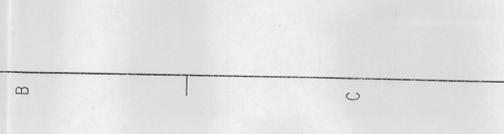
DETAIL 7  
3/4"=1'-0"  
REF S01027 S00986



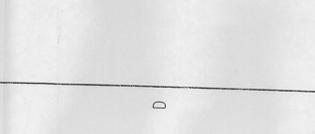
DETAIL 8  
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REF S01027 S00986



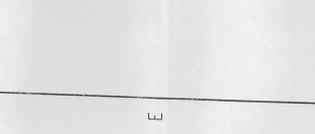
DETAIL 9  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 10  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 11  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 12  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 13  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 14  
3/4"=1'-0"  
REF S01027 S00986



DETAIL 15  
3/4"=1'-0"  
REF S01027 S00986

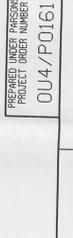
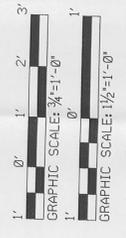
REF. DWG. NO.	DRAWING TITLE
94X-5900-X-00968	DRAWING INDEX
94X-5900-X-00969	LEGEND AND SYMBOLS
94X-5900-S-00979	KEY PLAN
94X-5900-S-00980	SILLO 1 AND 2 TOP CHORD ELEVATION
94X-5900-S-00985	ELEVATIONS
94X-5900-S-00986	ELEVATIONS

**PRELIMINARY**  
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A.E.	PERM'D	DATE
A	ISSUED FINAL FOR EPA REVIEW	N/A		

**UNITED STATES DEPARTMENT OF ENERGY**  
**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**  
THIS DRAWING PREPARED BY  
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THE RALPH M. PARSONS CO. - PARSONS MAIN, INC. - ENGINEERING-SCIENCE, INC.  
CINCINNATI, OHIO

PROJECT NAME		DRAWING TITLE	
SILLO SUPERSTRUCTURE DESIGN FOR INFORMATION ONLY		STRUCTURAL SECTIONS AND DETAILS SILLO 1 AND 2 SUPERSTRUCTURE	
DATE	DATE	CHECKED BY	DATE
08/27/98	08/27/98	R.B. JACHAV	08/27/98
PLANT/BUILDING NO.	FLOOR	SCALE	CLASS
		1/8"=1'-0"	40200
SUBMITTED FOR APPROVAL		PERM'D OR APPROVAL	AS NOTED
		N/A	
DATE		DATE	DATE
00-90701	00-90701	00-90701	00-90701
DRAWING INDEX CODE NO.		DRAWING INDEX CODE NO.	
94X-5900-S-01027		94X-5900-S-01027	
SHEET NO.		SHEET NO.	
0013		0013	

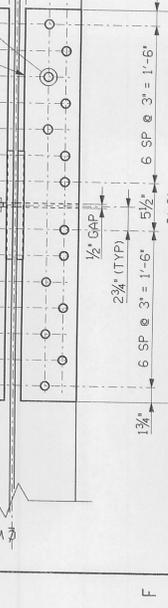
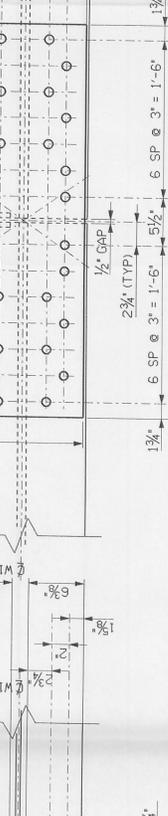
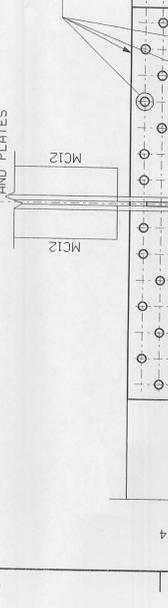
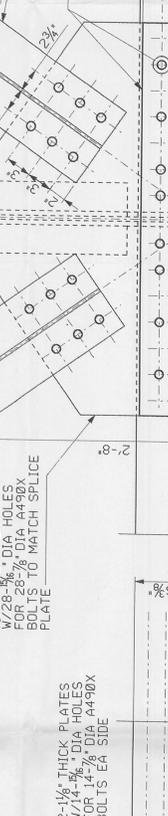
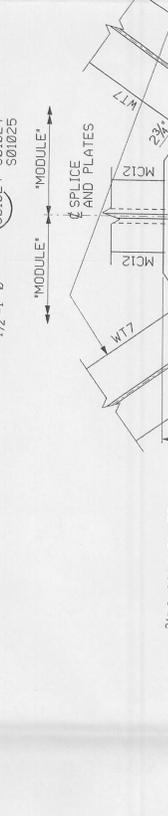
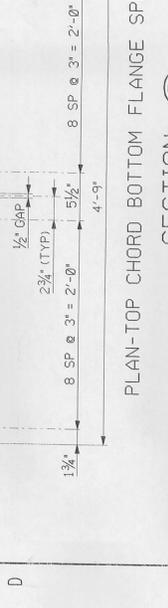
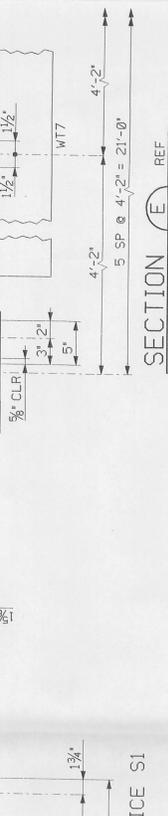
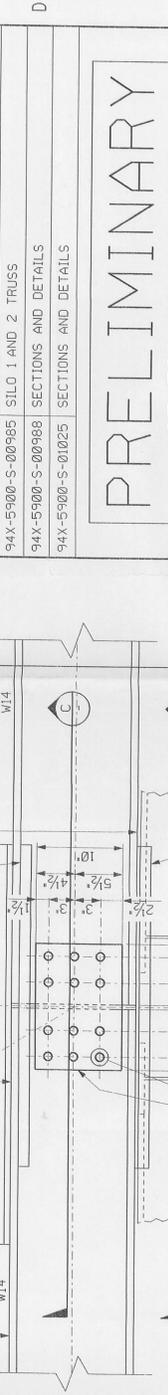
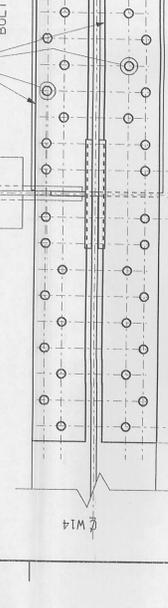
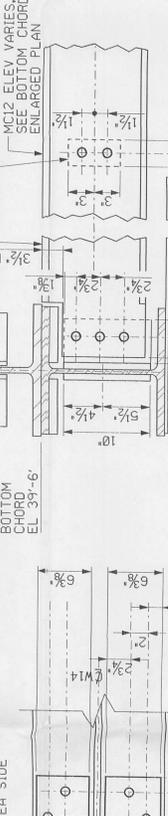
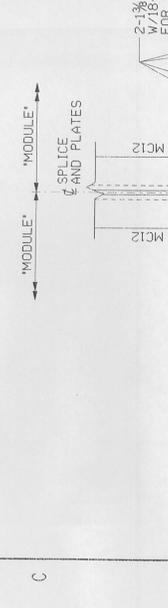
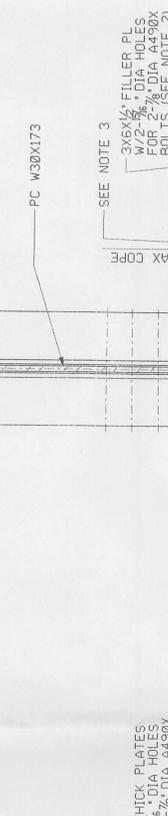
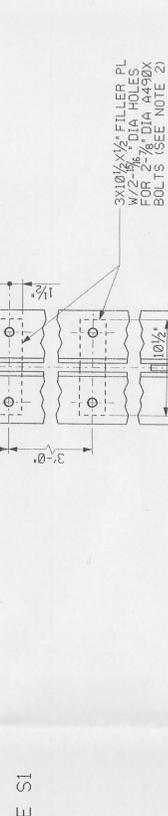
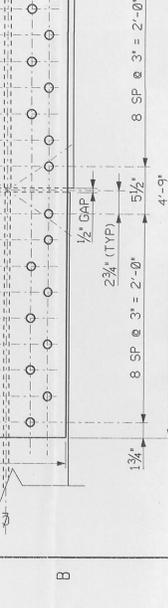
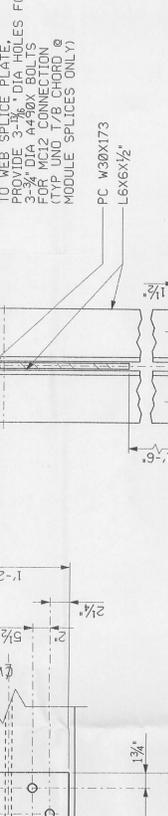
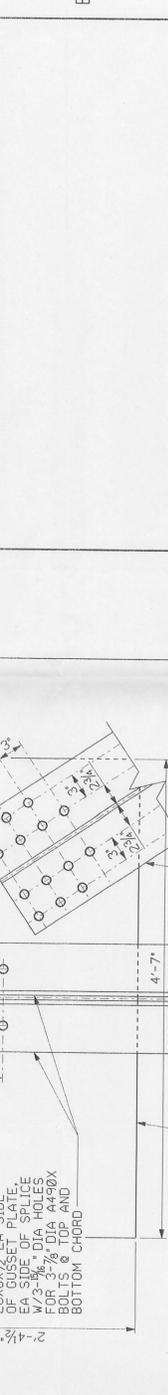
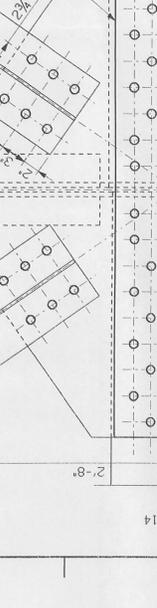
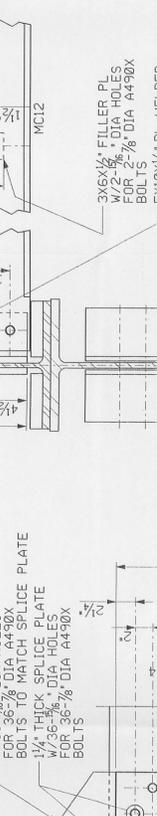
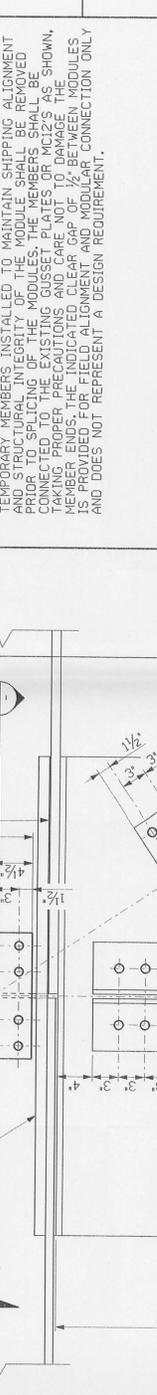
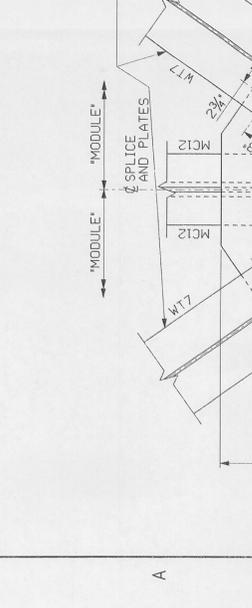
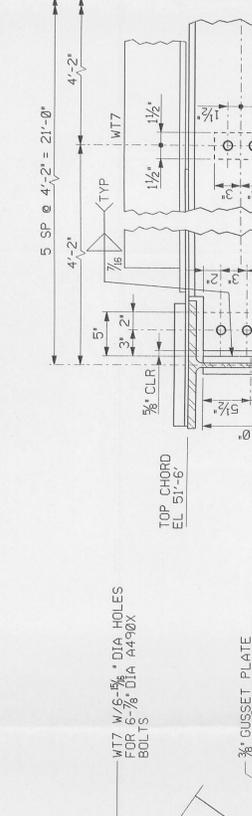
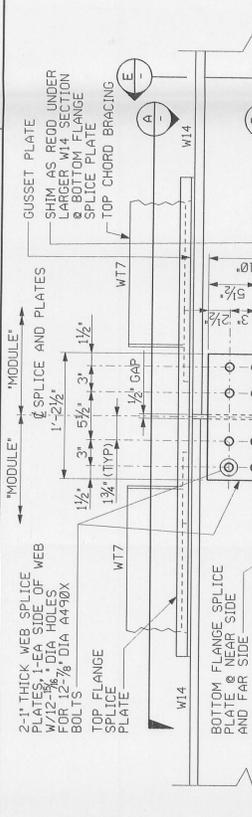


PREPARED UNDER PARSONS PROJECT ORDER NUMBER  
004/PO161



NOTES

1. FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-00979.  
 2. WELD FILLER PLATE TO ONE END OF MODULE WITH 1/2" FILLET WELD ALL AROUND.  
 3. 1" FLOOR PLATE AND 1/2" CHECKERED PLATE NOT SHOWN ON THE SECTION. SEE DRAWING 94X-5900-S-00979 FOR LOCATION AND WELDING DETAILS. FLOOR PLATES SHALL BE SHOP FABRICATED AND WELDING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF DRAWING 94X-5900-S-01025 FOR TYPICAL WELDING DETAIL AT MODULE.  
 4. TO FACILITATE MODULAR CONSTRUCTION OF THE SILO SUPERSTRUCTURE, THE SPLICE DETAILS HAVE BEEN DEVELOPED TO ACCOMMODATE SHOP DRILLED BOLT HOLES IN GUSSET PLATES OR FILLER PLATES TO RECEIVE FIELD BOLTS AT THE SPLICE LOCATION. THE GUSSET PLATES AND FILLER PLATES SHALL BE TEMPORARY MEMBERS INSTALLED TO MAINTAIN ALIGNMENT AND STRUCTURAL INTEGRITY OF THE MODULE. MEMBERS SHALL BE REMOVED PRIOR TO SPLICING OF THE MODULES. THE MEMBERS SHALL BE CONNECTED TO THE EXISTING GUSSET PLATES OR MC12'S AS SHOWN. MEMBER CONNECTIONS AND CARE NOT TO DAMAGE THE EXISTING MEMBER. THE CONNECTIONS AND MODULE CONNECTION ONLY IS PROVIDED FOR FIELD ALIGNMENT AND MODULAR CONNECTION ONLY AND DOES NOT REPRESENT A DESIGN REQUIREMENT.



392

NOTES

1. FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-00979.  
 2. WELD FILLER PLATE TO ONE END OF MODULE WITH 1/2" FILLET WELD ALL AROUND.  
 3. 1" FLOOR PLATE AND 1/2" CHECKERED PLATE NOT SHOWN ON THE SECTION. SEE DRAWING 94X-5900-S-00979 FOR LOCATION AND WELDING DETAILS. FLOOR PLATES SHALL BE SHOP FABRICATED AND WELDING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF DRAWING 94X-5900-S-01025 FOR TYPICAL WELDING DETAIL AT MODULE.  
 4. TO FACILITATE MODULAR CONSTRUCTION OF THE SILO SUPERSTRUCTURE, THE SPLICE DETAILS HAVE BEEN DEVELOPED TO ACCOMMODATE SHOP DRILLED BOLT HOLES IN GUSSET PLATES OR FILLER PLATES TO RECEIVE FIELD BOLTS AT THE SPLICE LOCATION. THE GUSSET PLATES AND FILLER PLATES SHALL BE TEMPORARY MEMBERS INSTALLED TO MAINTAIN ALIGNMENT AND STRUCTURAL INTEGRITY OF THE MODULE. MEMBERS SHALL BE REMOVED PRIOR TO SPLICING OF THE MODULES. THE MEMBERS SHALL BE CONNECTED TO THE EXISTING GUSSET PLATES OR MC12'S AS SHOWN. MEMBER CONNECTIONS AND CARE NOT TO DAMAGE THE EXISTING MEMBER. THE CONNECTIONS AND MODULE CONNECTION ONLY IS PROVIDED FOR FIELD ALIGNMENT AND MODULAR CONNECTION ONLY AND DOES NOT REPRESENT A DESIGN REQUIREMENT.

2-1" THICK WEB SPLICE PLATES, 1-1/2" DIA HOLES FOR 1-1/2" DIA A490X BOLTS

TOP FLANGE SPLICE PLATE

BOTTOM FLANGE SPLICE PLATE

1-1/2" THICK WEB SPLICE PLATES, 1-1/2" DIA HOLES FOR 1-1/2" DIA A490X BOLTS

TOP FLANGE SPLICE PLATE

BOTTOM FLANGE SPLICE PLATE

1-1/2" THICK WEB SPLICE PLATES, 1-1/2" DIA HOLES FOR 1-1/2" DIA A490X BOLTS

TOP FLANGE SPLICE PLATE

BOTTOM FLANGE SPLICE PLATE

1-1/2" THICK WEB SPLICE PLATES, 1-1/2" DIA HOLES FOR 1-1/2" DIA A490X BOLTS

TOP FLANGE SPLICE PLATE

BOTTOM FLANGE SPLICE PLATE

1-1/2" THICK WEB SPLICE PLATES, 1-1/2" DIA HOLES FOR 1-1/2" DIA A490X BOLTS

TOP FLANGE SPLICE PLATE

REF	DWG NO.	DRAWING INDEX	DRAWING TITLE
94X-5900-X-00968			
94X-5900-X-00969			
94X-5900-S-00979			
94X-5900-S-00983			
94X-5900-S-00985			
94X-5900-S-00988			
94X-5900-S-01025			

PRELIMINARY  
NOT FOR CONSTRUCTION

ISSUE NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	ISSUED DATE	INITIALS AND DATE
A	ISSUED FOR FINAL EPA REVIEW		N/A	

UNITED STATES  
DEPARTMENT OF ENERGY  
FERMALD ENVIRONMENTAL MANAGEMENT PROJECT

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

PROJECT NAME  
SILO SUPERSTRUCTURE DESIGN  
SILOS PROJECT

DATE	DATE	DATE	DATE	DATE	DATE
07/12/96	07/12/96	07/12/96	07/12/96	07/12/96	07/12/96

STRUCTURAL  
SECTIONS AND DETAILS  
SILO 1 AND 2 SUPERSTRUCTURE

DATE: 07/12/96  
 CHECKED BY: G.H.B./R.B./JADHAY  
 DATE: 07/04/96  
 SCALE: AS NOTED  
 CLASS: 40200

DATE: 00-90701  
 DRAWING NUMBER: 94X-5900-S-01024  
 SHEET NO.: S0011  
 REF. NO.: A

GRAPHIC SCALE: 1/2"=1'-0"

SECTION 1/2"=1'-0"

NOTES

1. FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-00979.

2. DESIGN OF CONNECTIONS EXCEPT AS SHOWN ON DRAWING 94X-5900-S-0024, S-0025, AND S-0027 INCLUDING SIZES AND DIMENSIONS OF GUSSET PLATES, WELDS, SIZES, AND NUMBER OF BOLTS REQUIRED SHALL BE THE RESPONSIBILITY OF THE FABRICATOR. BOLTS HAVE NOT BEEN SHOWN FOR CLARITY.

3. BEFORE INSTALLING GUSSET PLATE ON COLUMN LINE, CHECK FOR CORROSION AND CRACKS IN COLUMN LINE. REPAIR CRACKS AND CORROSION BEFORE INSTALLING GUSSET PLATE.

4. WELDS IN CONNECTIONS SHALL BE WELDED TO BASE PLATE WITH FULL PENETRATION WELD BEFORE WELDING BASE PLATE TO COLUMN BASE WITH FILLET WELD ALL AROUND.

5. PROVIDE 1/2" X 5/8" X 6" WASHER PLATE FOR OVERSIZE BOLT HOLES IN THE BASE PLATE.

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	REVISED DATE
C	ISSUED FINAL FOR EPA REVIEW	N/A	N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW	N/A	N/A
A	ISSUED FOR 90% DESIGN REVIEW	N/A	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  
SILO SUPERSTRUCTURE DESIGN FOR INFORMATION ONLY

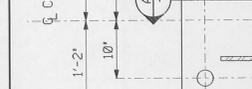
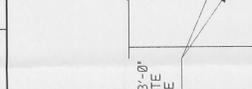
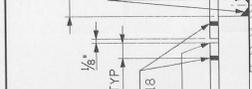
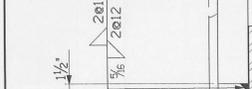
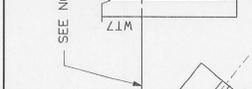
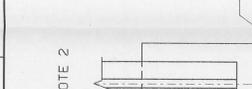
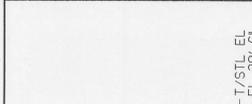
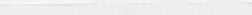
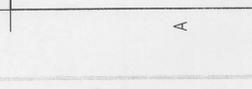
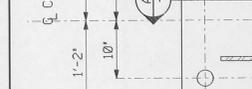
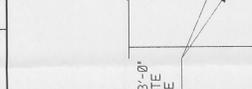
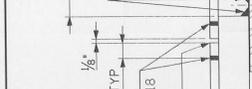
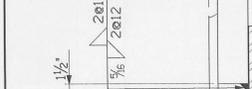
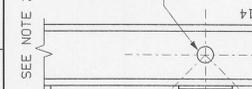
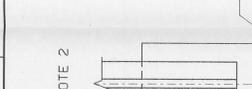
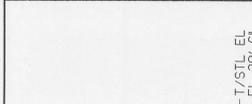
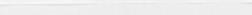
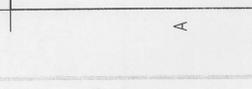
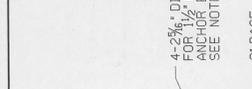
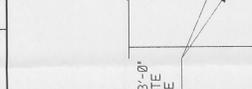
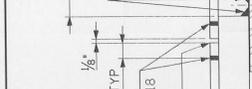
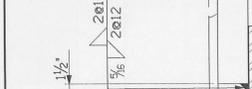
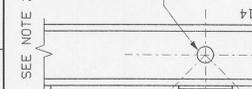
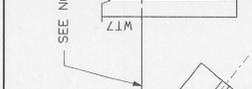
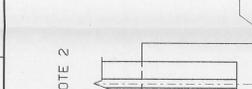
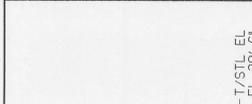
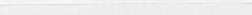
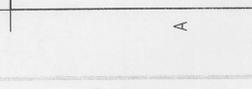
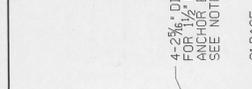
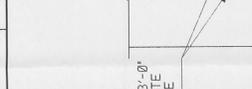
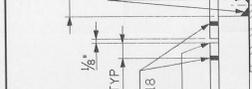
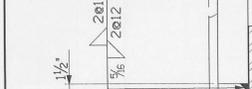
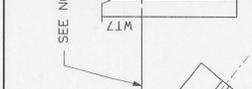
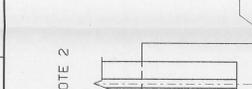
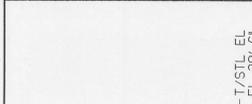
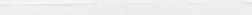
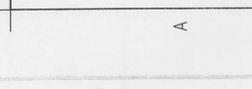
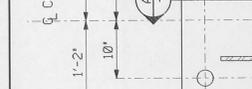
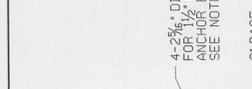
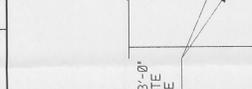
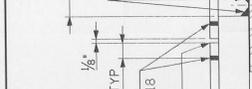
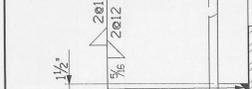
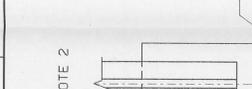
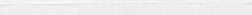
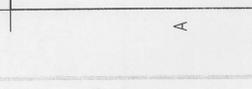
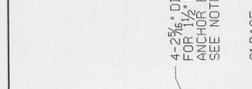
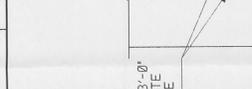
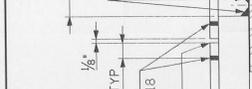
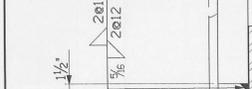
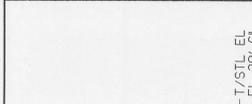
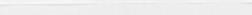
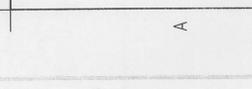
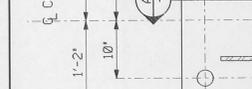
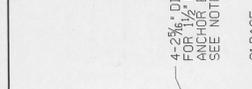
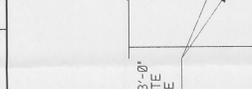
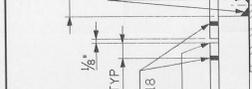
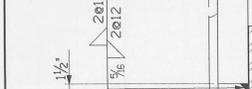
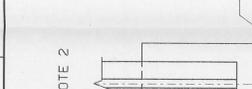
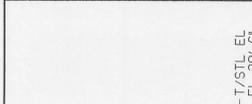
STRUCTURAL AND DETAILS  
SILO 1 AND 2

DRAWN BY	DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
J. LONEY	1-18-96	R.B. JUDAH/N.R.M.	4/19/96		

DATE	FLOOR	SCALE	CLASS
1-18-96		1/2"=1'-0"	40200

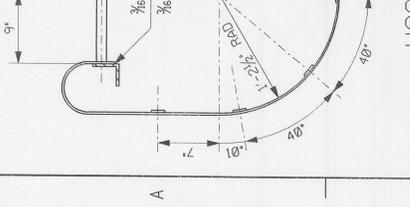
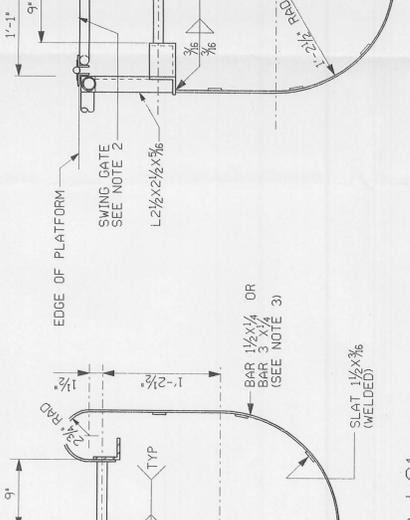
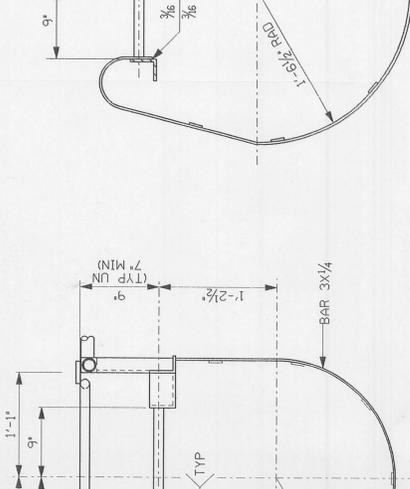
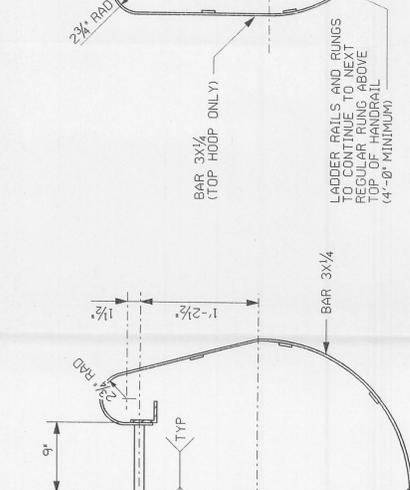
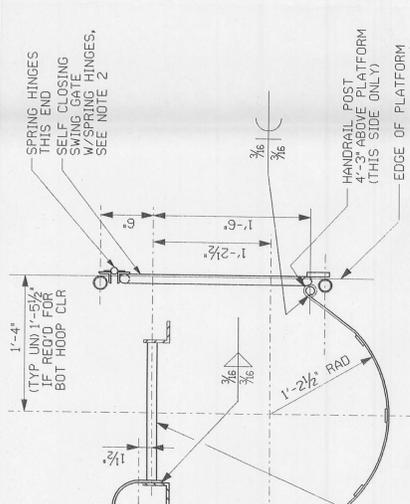
DATE: 1-18-96  
DRAWING INDEX CODE NO.: 00-90701  
SHEET NO.: 500110  
REV. NO.: C

04U/P0161





- NOTES
- INSIDE OF CAGE TO BE SMOOTH AND CLEAR OF PROJECTIONS. BOLTS, WHERE REQUIRED, SHALL BE COUNTERSUNK OR HAVE ROUND HEADS ON INSIDE OF CAGE.
  - SELF CLOSING SWING GATE REQUIRED AT ALL OPENINGS.
  - PROVIDE CAGE FOR LADDERS OVER 20'-0" HIGH FLOOR TO FLOOR. FOR RUNS OVER 30'-0" OFFSET LADDERS & PROVIDE SIDESTEP PLATFORMS.
  - INTERMEDIATE SPLICE HOOP @ 20'-0" MAXIMUM SPACING (BAR 3"x1 1/4").
  - LADDER RAILS MAY BE WELDED USING AWS MIN WELD TO FEET IN LIEU OF BOLTING.
  - FABRICATOR SHALL DESIGN AND DETAIL CAGED LADDER AND HANDRAILS TO MEET OSHA SAFETY AND HEALTH STANDARDS AND ARE TO BE USED AS A GUIDE. WELDED DETAILS AS SHOWN ON THIS DRAWING.
  - FOR MATERIAL SPECIFICATIONS, SEE GENERAL NOTES ON DRAWING 94X-5900-S-009774.



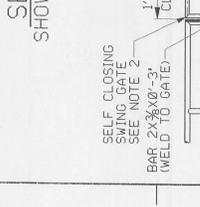
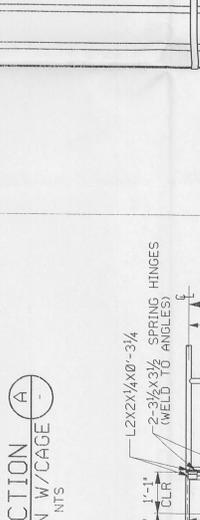
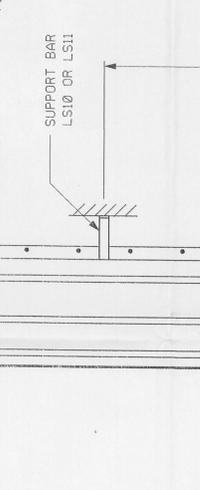
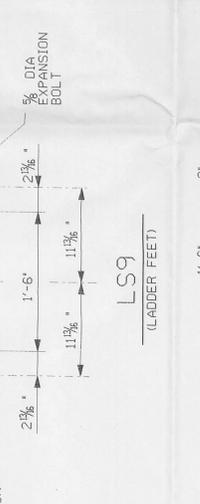
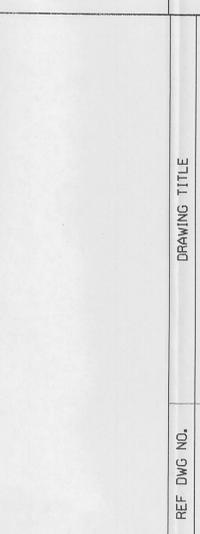
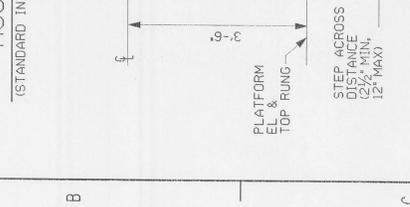
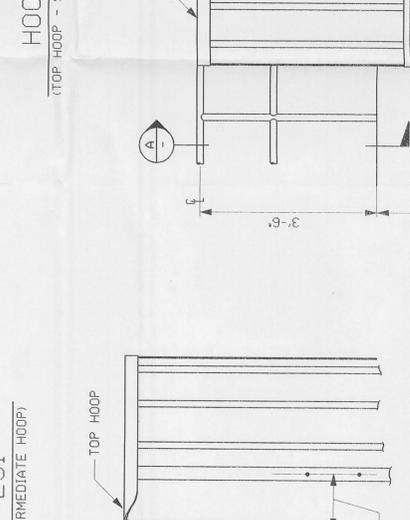
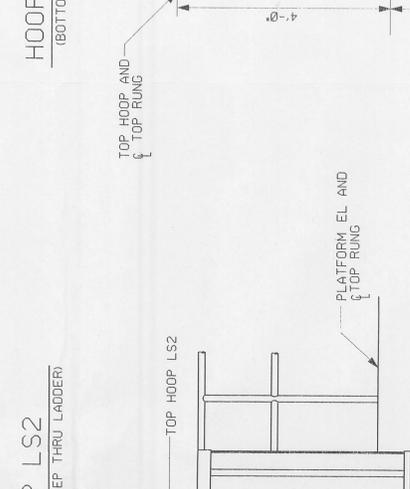
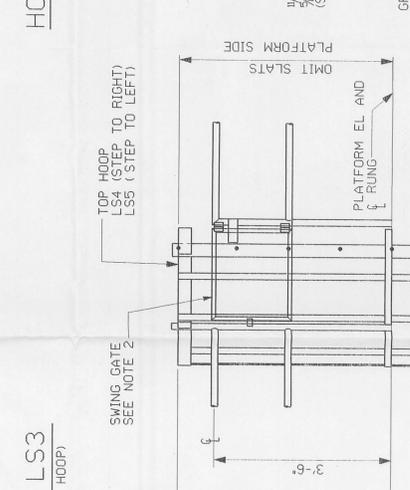
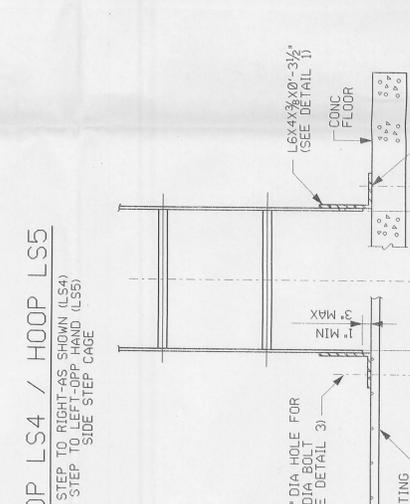
REF DWG NO.

94X-5900-X-00968	DRAWING INDEX
94X-5900-X-00969	LEGEND AND SYMBOLS
94X-5900-S-00979	KEY PLAN

DRAWING TITLE

PRELIMINARY  
NOT FOR CONSTRUCTION

REV	DATE	ISSUE OR REVISION PURPOSE - DESCRIPTION
A	4-8-96	ISSUED FOR 90% DESIGN REVIEW
B	4-8-96	ISSUED PRE-FINAL FOR EPA REVIEW
C	4-8-96	ISSUED FINAL FOR EPA 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  
**SILO SUPERSTRUCTURE DESIGN FOR INFORMATION ONLY**

DRAWING TITLE  
**ELEVATIONS AND DETAILS  
SILO 1 AND 2 LADDERS**

DRAWN BY  
J. LONEY

CHECKED BY  
RB. JACHAV

DATE  
2-08-96

SCALE  
NONE

CLASS  
4-8-96

ISSUED FOR APPROVAL  
DATE  
4-8-96

TERMOG CRU APPROVAL  
DATE  
N/A

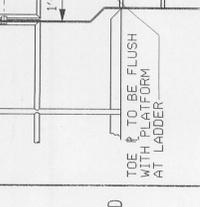
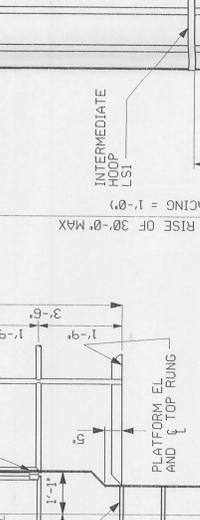
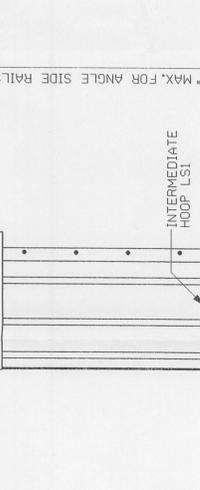
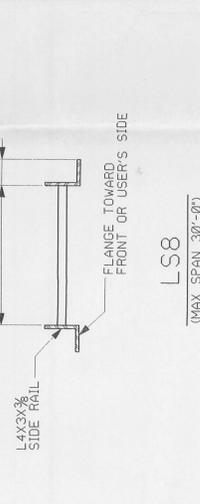
FERMOG PROJECT NO.  
40200

DATE  
MBS 11114.3.2

DRAWING INDEX CODE NO.  
00-90701

SHEET NO.  
S0015

REV. NO.  
C



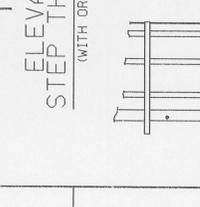
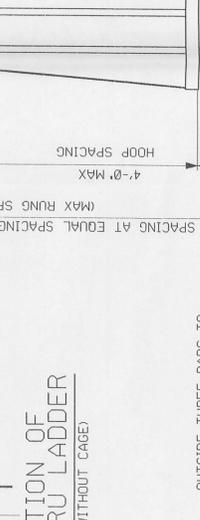
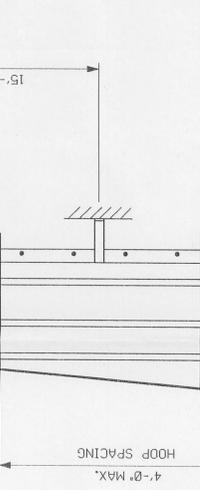
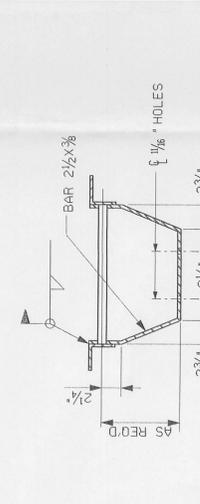
REF DWG NO.

94X-5900-X-00968	DRAWING INDEX
94X-5900-X-00969	LEGEND AND SYMBOLS
94X-5900-S-00979	KEY PLAN

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CHECKED BY  
RB. JACHAV

DATE  
2-08-96

SCALE  
NONE

CLASS  
4-8-96

ISSUED FOR APPROVAL  
DATE  
4-8-96

TERMOG CRU APPROVAL  
DATE  
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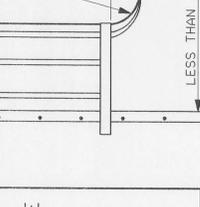
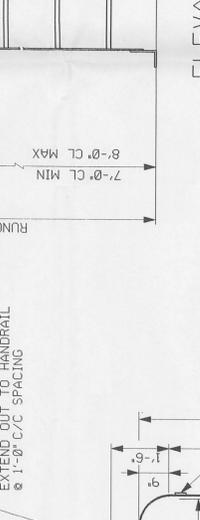
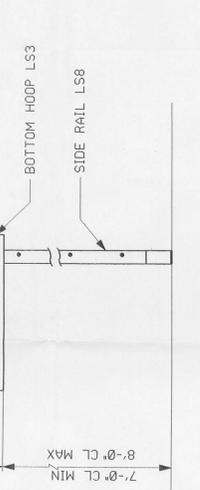
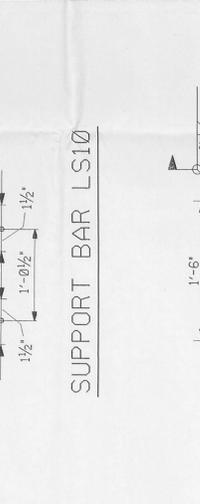
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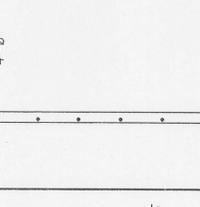
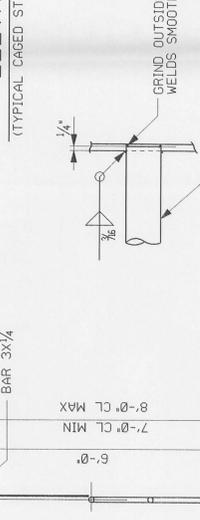
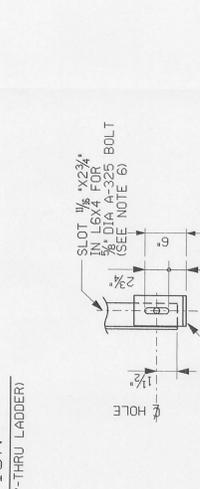
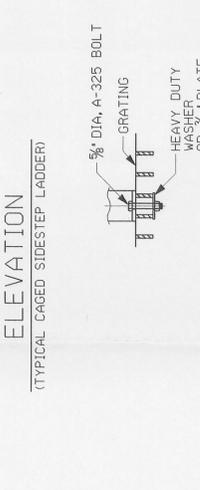
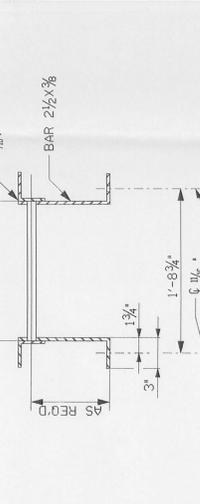
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94X-5900-X-00969	LEGEND AND SYMBOLS
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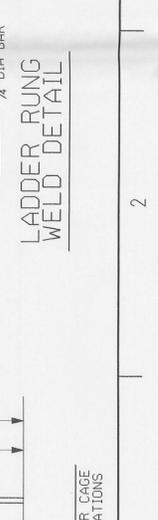
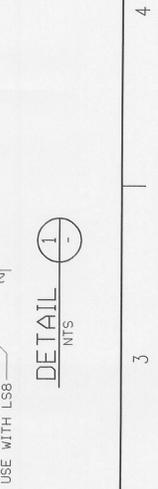
FERMOG PROJECT NO.  
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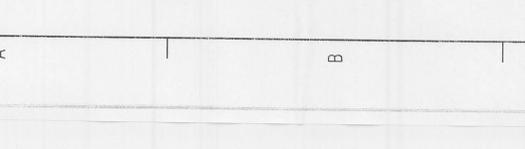
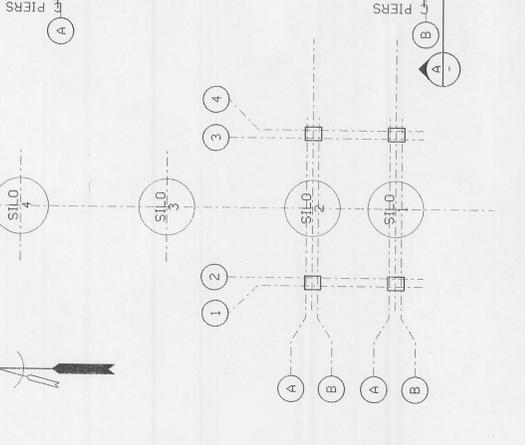
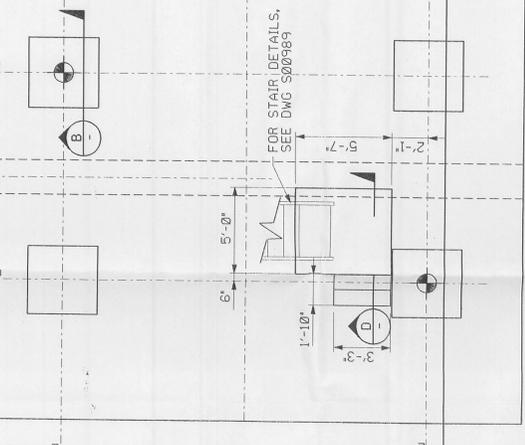
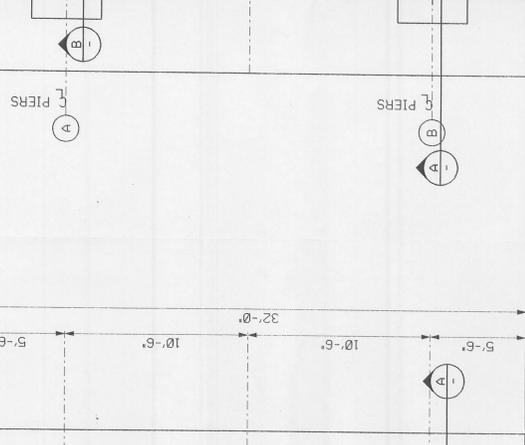
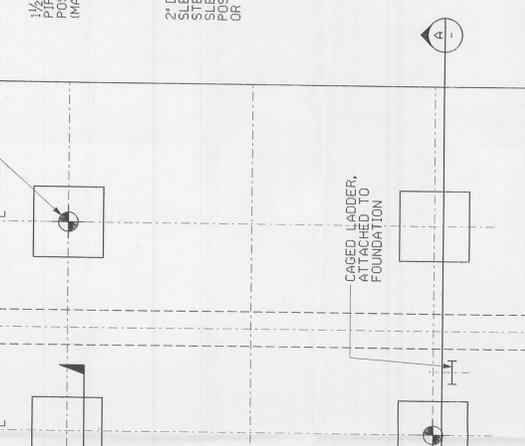
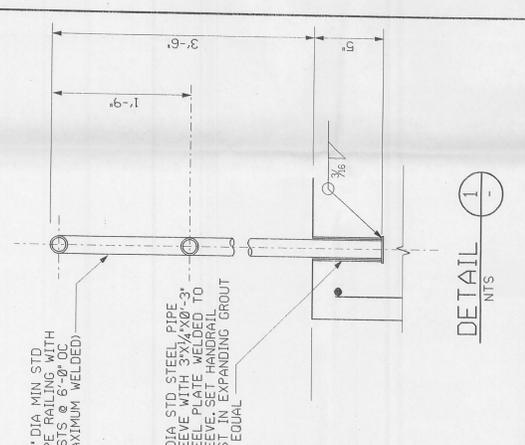


NOTES

- FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-00979.
- PROVIDE 2"x1/4" THICK CONCRETE NOSING STRIPS AS MANUFACTURED BY AMERICAN SAFETY TREAD COMPANY OR EQUAL.
- BOTTOM OF BASE PLATE ELEVATION 0'-0" EQUALS MEAN SEA LEVEL ELEVATION 981'-0".

GENERAL CONCRETE NOTES

- DESIGN, MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 03001.
- FOUNDATION CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, FOR WEST AND EAST TOWER MAIN KEY, AND PIERS. ALL OTHER FOUNDATIONS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
- REINFORCING STEEL SHALL CONFORM TO ASTM SPECIFICATION A615.
- FOUNDATIONS SHALL BE BASED ON SOIL BEARING CAPACITY ALLOWABLE OF 3000 PSF. PROVIDE A TECHNICAL DESIGN INVESTIGATION REPORT FOR SILO SUPERSTRUCTURE, DATED MAY, 1996, REVISION 0.
- CONTRACTOR HAS OPTION TO POUR SHEAR KEY AND FOOTING IN ONE POUR.
- TENSION-COMPRESSION MECHANICAL CONNECTIONS PER ACI 439-3R SHOULD BE USED TO SIMPLIFY CONSTRUCTION OF TIES AROUND THE PIERS.

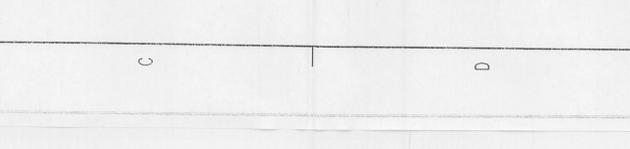
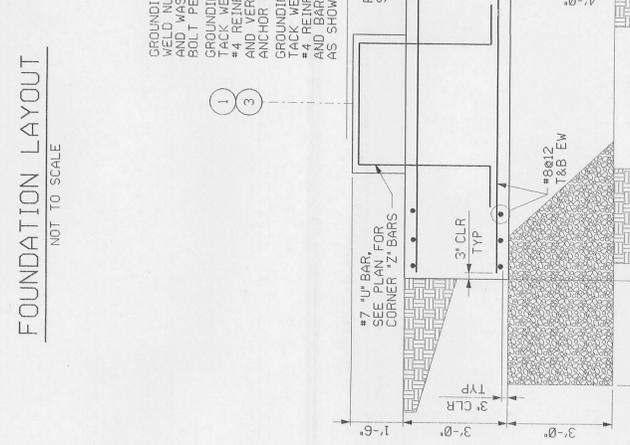
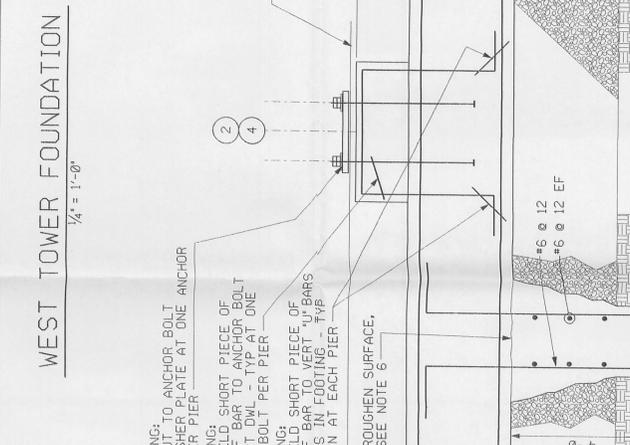
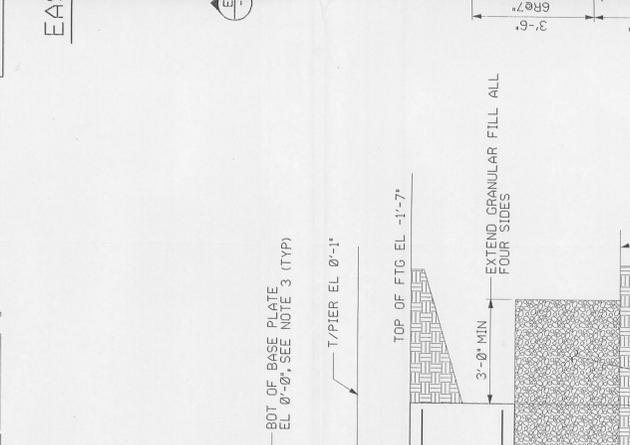
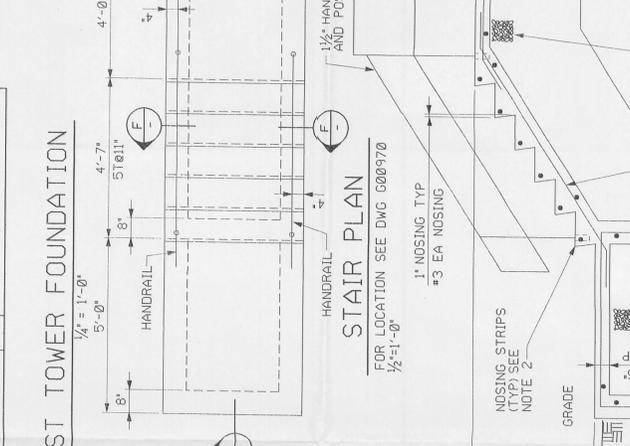
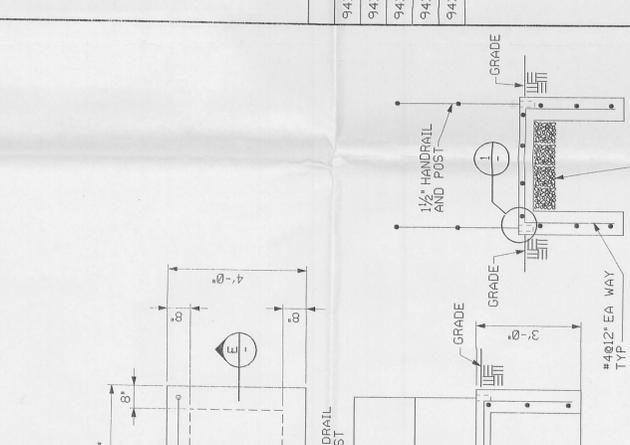
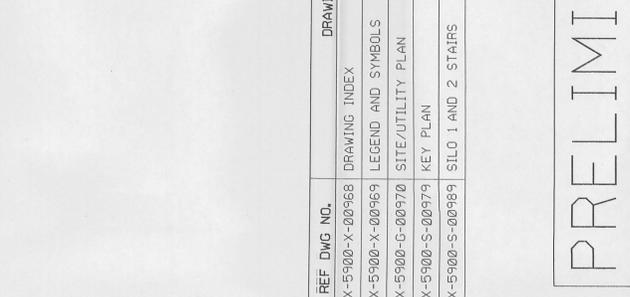


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- BOTTOM OF BASE PLATE ELEVATION 0'-0" EQUALS MEAN SEA LEVEL ELEVATION 981'-0".

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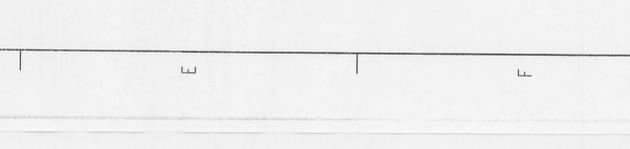
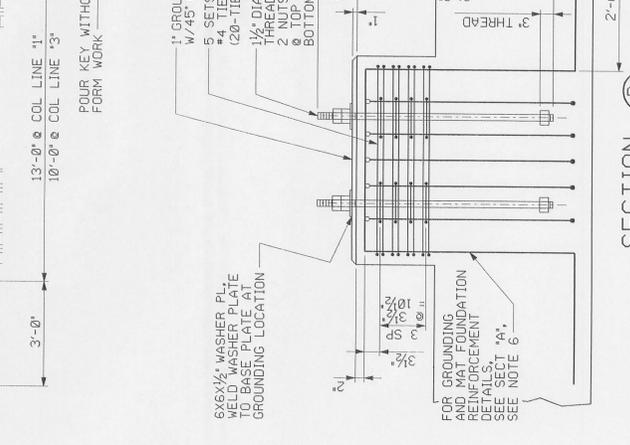
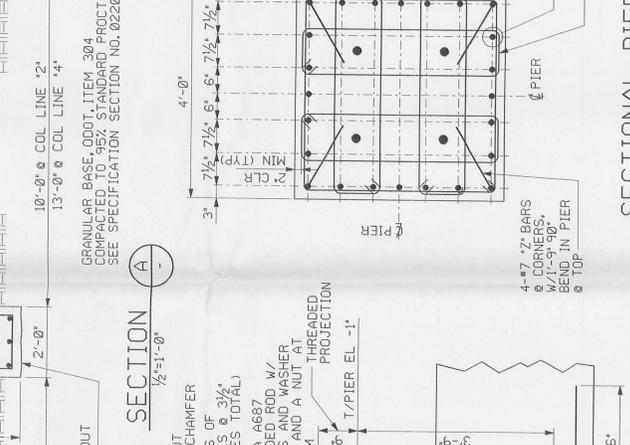
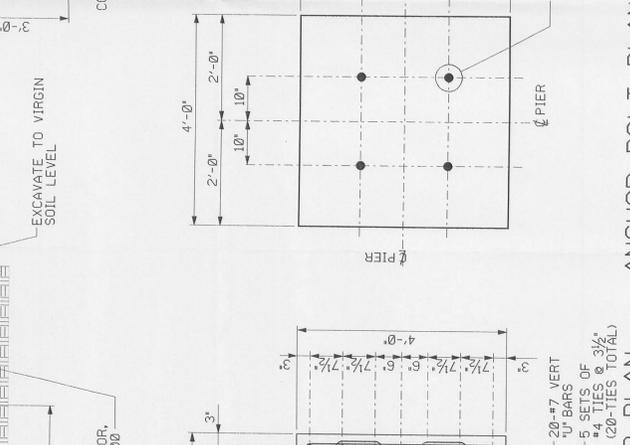
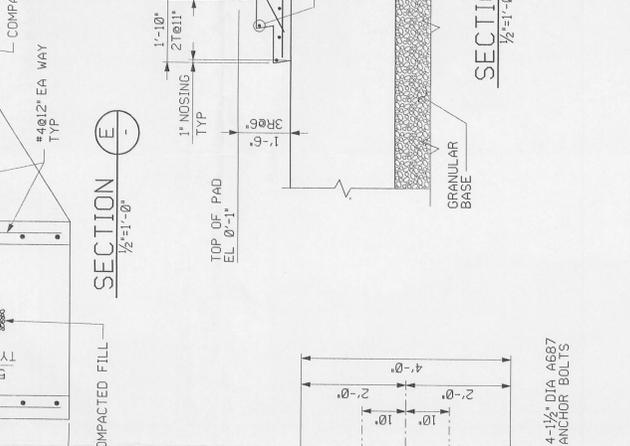
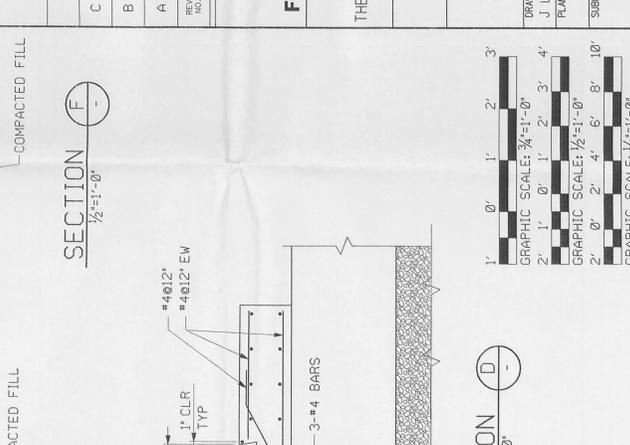
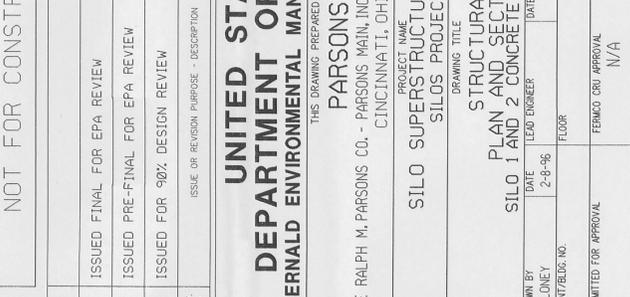


NOTES

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- TENSION-COMPRESSION MECHANICAL CONNECTIONS PER ACI 439-3R SHOULD BE USED TO SIMPLIFY CONSTRUCTION OF TIES AROUND THE PIERS.



COORDINATE LOCATION (TYP), SEE DWG 600970

1 1/2" DIA MIN STD PIPE RAILING WITH POSTS @ 6'-0" OC. (MAXIMUM WELDED)

2" DIA STD STEEL PIPE SLEEVE WITH 3/4"x10"-3" STEEL PLATE WELDED TO SLEEVE. SET HANDRAIL POST IN EXPANDING GROUT OR EQUAL

CAGED LADDER, ATTACHED TO FOUNDATION

1'-10" NOSING TYP  
 #3 EA NOSING

1 1/2" HANDRAIL AND POST

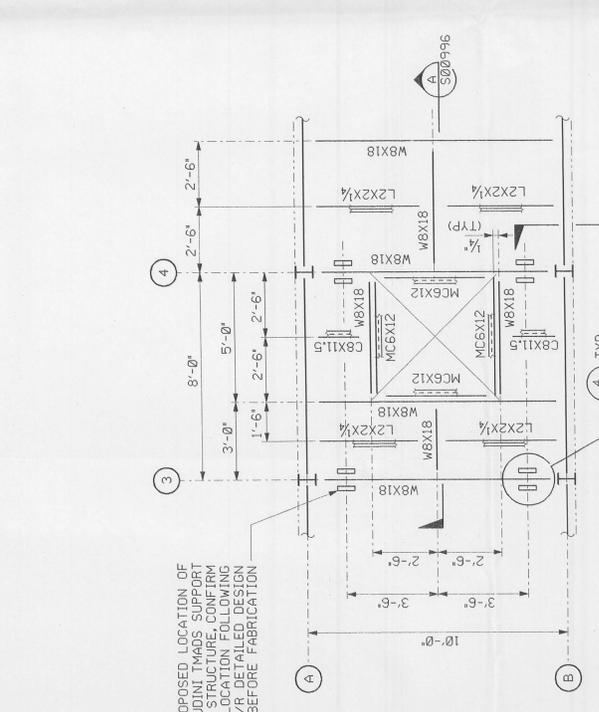
4" EA NOSING TYP  
 #4@12" EA WAY

1'-10" NOSING TYP  
 #4@12" EA WAY

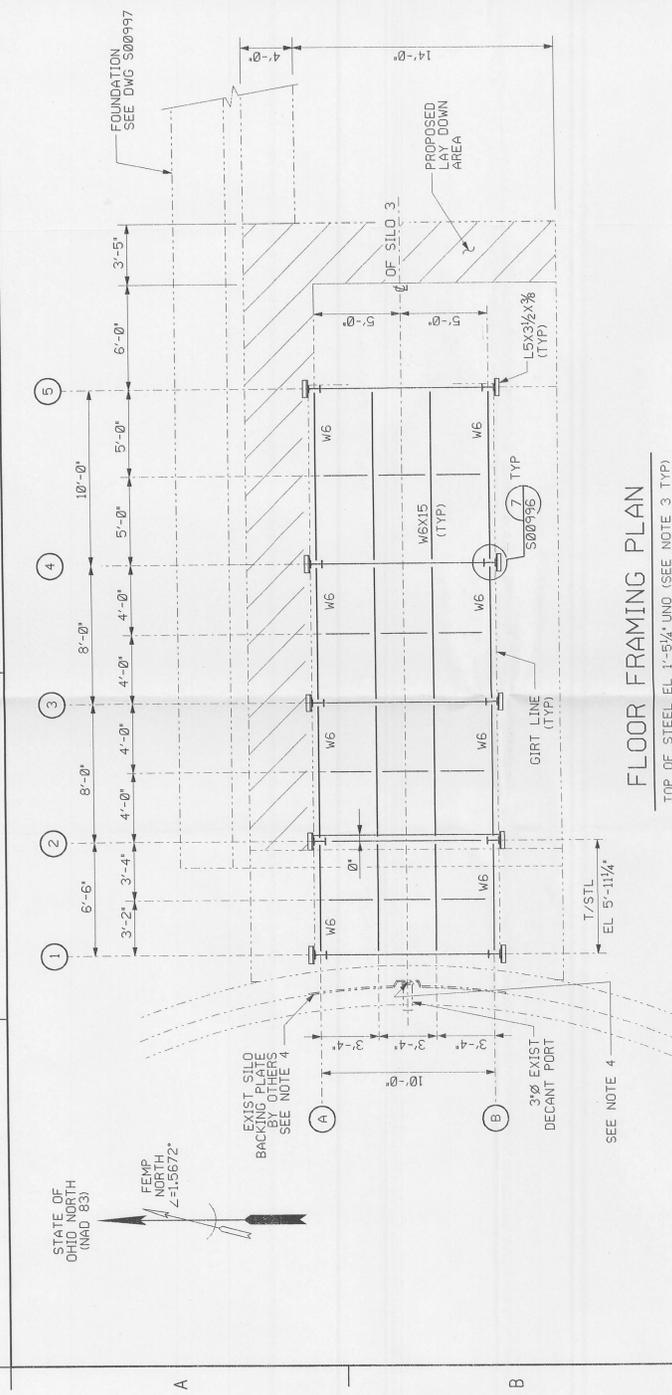
1'-10



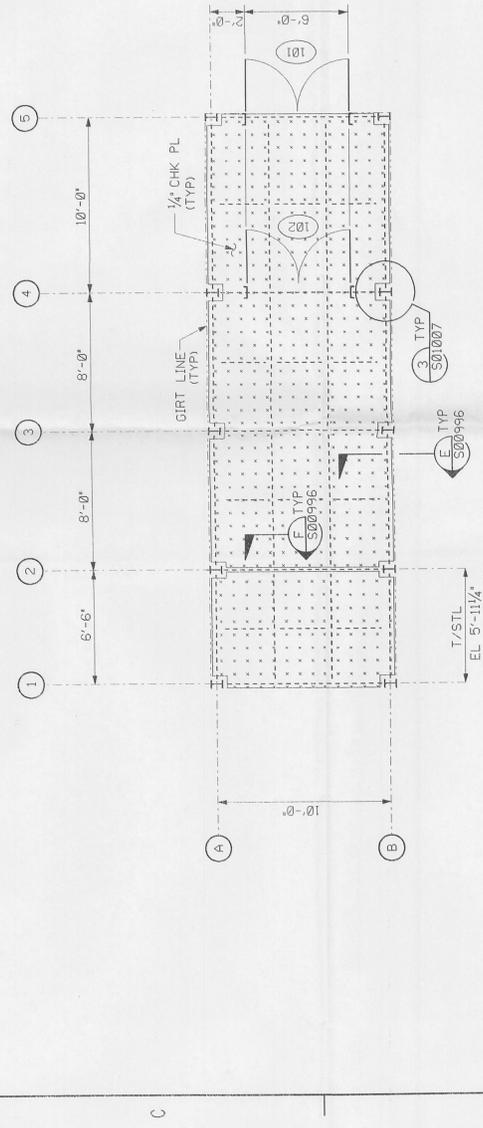
1. FOR GENERAL STEEL NOTES, SEE DRAWING 9X-5900-S-00979.
2. REF EL 0'-0" = ELEV 569.92.
3. ALL ASSEMBLY DIMENSIONS ARE DERIVED FROM SILO BOTTOM PORT ELEVATIONS. CONTRACTOR IS TO VERIFY COORDINATES AND ELEVATIONS (PER DWG 000970) OF EAST & WEST SIDE BOTTOM PORTS PRIOR TO CONSTRUCTION AND FABRICATION. ALL CONFLICTS ARE TO BE BROUGHT TO FERMCOS ATTENTION. FERMCOS APPROVAL IS NECESSARY PRIOR TO FABRICATION.
4. SPECIFIC INTERFACES BETWEEN EQUIPMENT ENCLOSURE AND SILO BACKING PLATE WILL BE DESIGNED DURING TITLE II DESIGN OF RESIDUE RETRIEVAL SYSTEM.



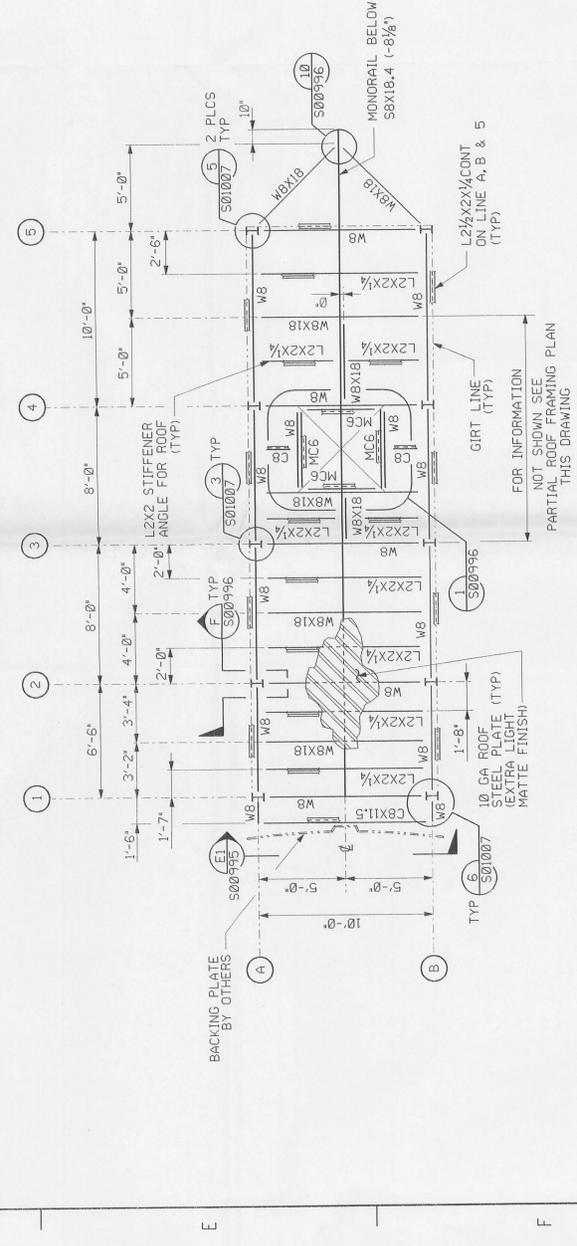
**PARTIAL ROOF FRAMING PLAN**  
 TOP OF STEEL EL 14'-7 1/2"  
 3/8" = 1'-0"



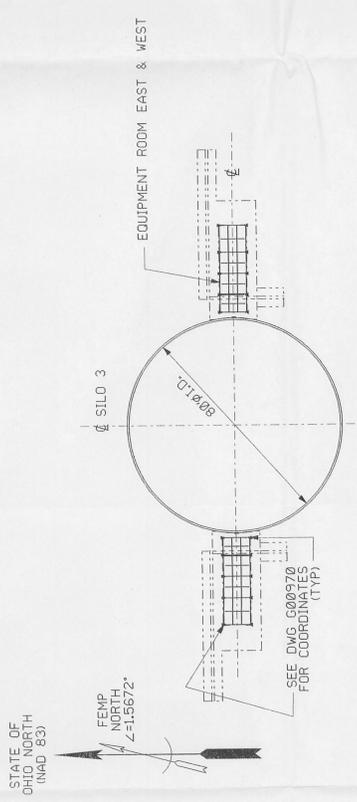
**FLOOR FRAMING PLAN**  
 TOP OF STEEL EL 1'-5 1/4" UNO (SEE NOTE 3 TYP)



**FINISHED FLOOR - PLAN**  
 TOP OF CHECKED PLATE EL 1'-5 1/4"  
 TOP OF STEEL EL 1'-5 1/4" UNO  
 TOP OF FINISHED FLOOR EL 1'-5 1/4" UNO  
 FOR DIMENSIONS AND DETAILS, SEE DRAWING S01007



**ROOF FRAMING PLAN**  
 TOP OF STEEL EL 14'-7 1/2"



**KEY PLAN**  
 NTS

NOTE: DRAWINGS NOS. 94X-5900-S-00994 THRU S-00996 & S-01007 SHOW EQUIPMENT ROOM ON EAST SIDE OF SILO. EQUIPMENT ROOM THIS SIDE MIRROR IMAGED ALONG CENTER LINE OF SILO 3. ALL MEMBER SIZES ARE SAME EXCEPT FLOOR BEAMS BETWEEN LINES A AND B ON COLUMN LINES 1 THRU 5 ARE REPLACED BY W12X26 SEE SECTION C. ELEVATIONS OF FLOOR AND STEEL FRAMING FOR WEST SIDE EQUIPMENT ROOM WILL BE 6 1/2" HIGHER THAN THOSE SHOWN ON THE DRAWINGS TO ACCOMMODATE THE DIFFERENCE IN PORT ELEVATIONS.

REF DWG NO.	DRAWING TITLE
94X-5900-S-00968	INDEX DRAWING
94X-5900-S-00969	LEGEND AND SYMBOLS
94X-5900-S-00977	KEY PLANS
94X-5900-S-00995	ELEVATIONS
94X-5900-S-00996	SECTIONS AND DETAILS
94X-5900-S-00997	PLAN, SECTIONS AND DETAILS
94X-5900-S-01007	SECTIONS AND DETAILS
94X-5900-G-00970	SITE/UTILITY PLAN

**PRELIMINARY**  
 NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	DATE
C	ISSUED FINAL FOR EPA REVIEW		N/A
B	ISSUED PRE-FINAL FOR EPA REVIEW		N/A
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  
**SILO SUPERSTRUCTURE DESIGN**  
 DRAWING TITLE  
**STRUCTURAL INFORMATION ONLY**  
**SILO 3 EQUIPMENT ENCLOSURE**  
 DRAWN BY  
 E. LESTER  
 DATE  
 3-4-96  
 CHECKED BY  
 N. HOJHARAN  
 DATE  
 8/10/96  
 SCALE  
 AS NOTED  
 PROJECT NO.  
 40200

DATE	DESCRIPTION	BY
11/11/94	PROJECT NO. 94X-5900-S-00994	WBS
11/11/94	DRAWING INDEX CODE NO. 00-90701	WBS
11/11/94	DRAWING INDEX CODE NO. 00-90701	WBS

PREPARED UNDER PARSONS PROJECT ORDER NUMBER  
 004/P0161



GRAPHIC SCALE: 1/4" = 1'-0"

GRAPHIC SCALE: 3/8" = 1'-0"

- FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-00979.
- ALL CB GIRTS ARE C8X11.5 TYPICAL.
- FLOOR, WALLS & ROOF PLATE JOINTS SHALL BE SEAL WELDED.
- FABRICATOR TO LOCATE SHOP JOINTS IN FLOOR, WALL & ROOF PLATES AS REQUIRED AND IN ACCORDANCE WITH STANDARD CONNECTION DETAILS SHOWN ON DRAWINGS.
- WALLS AND ROOF PLATES TO BE 10 GA CARBON STEEL.
- MONORAIL BEAM CAPACITY IS 2 TONS.
- SILO 3 EQUIPMENT ENCLOSURES SHALL BE SHOP FABRICATED AND SHIPPED AS ONE PIECE.
- DAMPER DETAILS AND FRAMING TO BE DETERMINED DURING TITLE II DESIGN OF RESIDUE RETRIEVAL SYSTEM.
- COMPLETED EQUIPMENT ENCLOSURE SHALL BE SEALED SUFFICIENTLY TO PREVENT AIR INLEAKAGE FROM PERIPHERAL PRESSURE WITH LESS THAN .100 CFM OF INFILTRATION.

REF	DWG NO.	DRAWING TITLE
94X-5900-X-00968		DRAWING INDEX
94X-5900-X-00969		LEGEND AND SYMBOLS
94X-5900-S-00979		KEY PLAN
94X-5900-S-00994		PLANS
94X-5900-S-00996		SECTIONS AND DETAILS
94X-5900-S-01007		SECTIONS AND DETAILS

**PRELIMINARY**  
NOT FOR CONSTRUCTION

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

UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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

PROJECT NAME  
**SILO SUPERSTRUCTURE DESIGN**

DATE	LEAD ENGINEER	DATE	CHECKED BY	DATE
3-4-96	N. MOHANDAM	4/05/96	N/A	

SCALE: 1/4" = 1'-0"

PROJECT NO. 40200

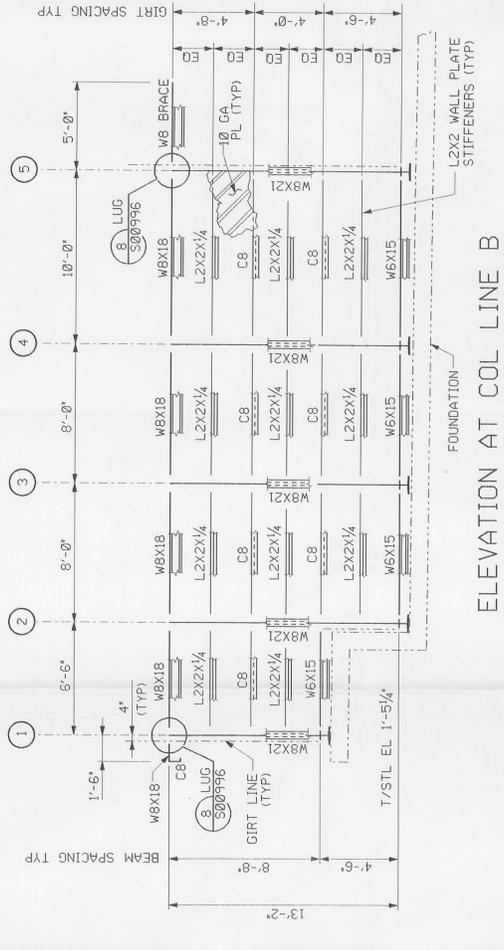
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DRAWING INDEX CODE NO. 94X-5900-S-00995

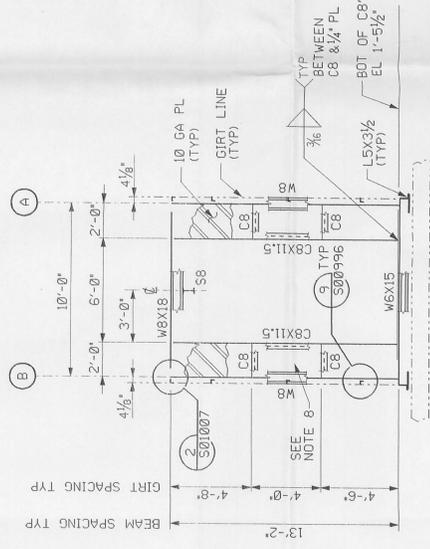
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ORDER NUMBER 004/P0161

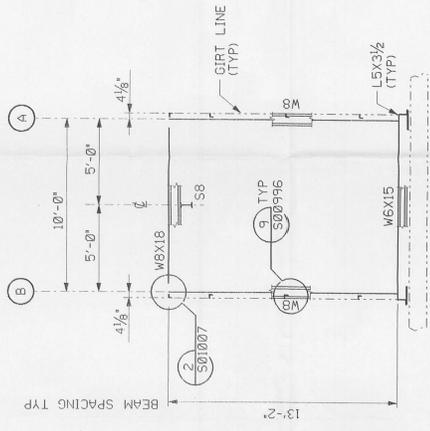
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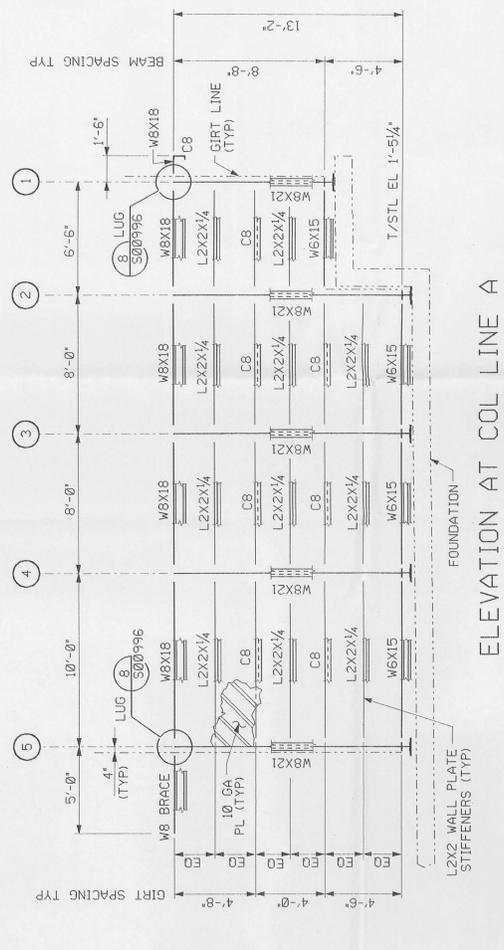
ELEVATION AT COL LINE B  
LOOKING NORTH



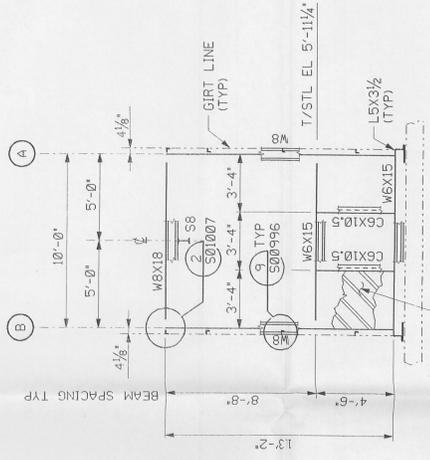
ELEVATION AT COL LINE 4



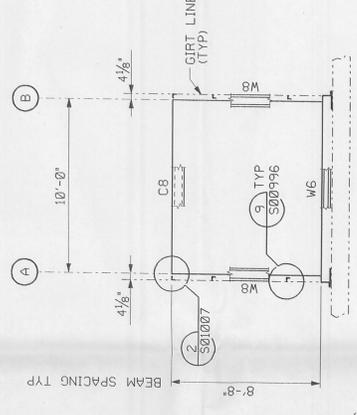
ELEVATION AT COL LINE 3



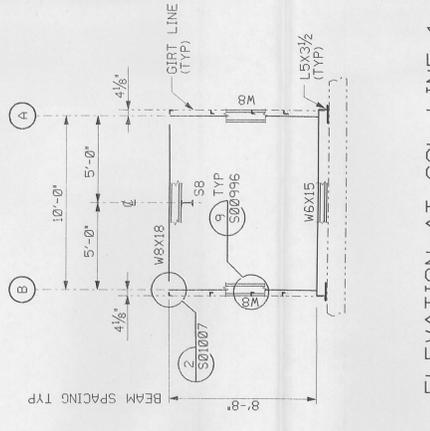
ELEVATION AT COL LINE A  
LOOKING SOUTH



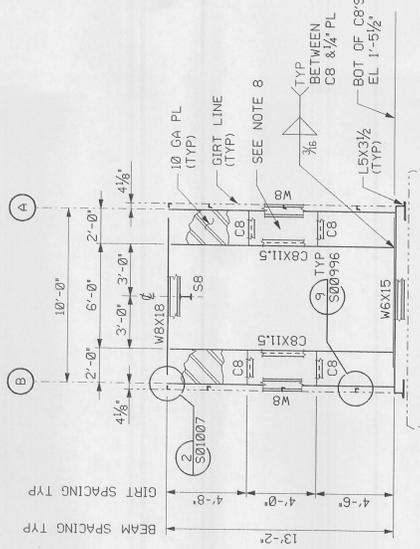
ELEVATION AT COL LINE 2



ELEVATION (E1) REF 500996 S00994

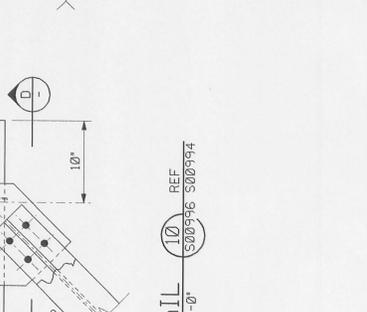
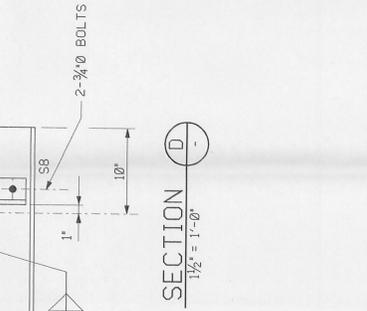
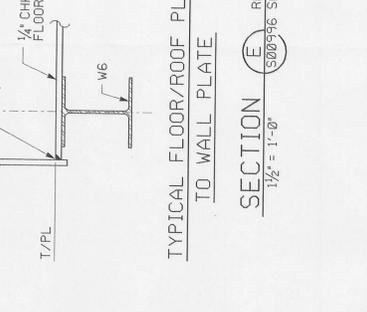
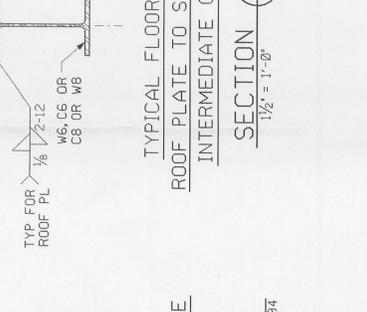
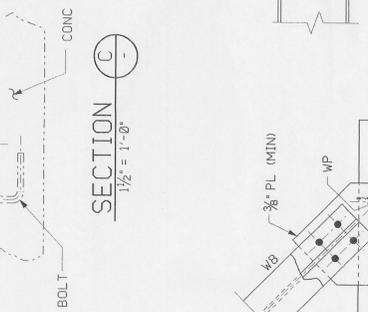
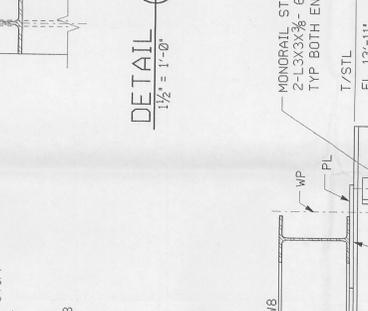
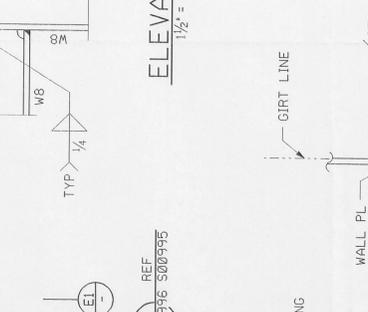
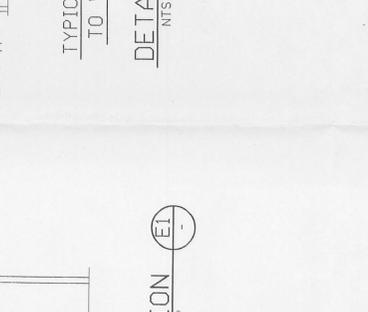
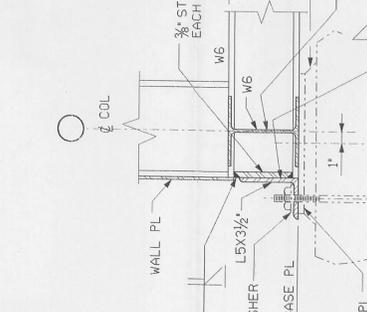
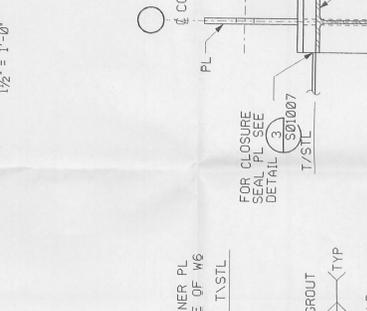
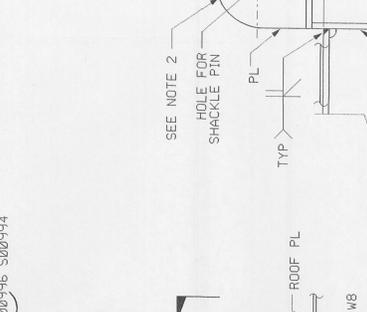
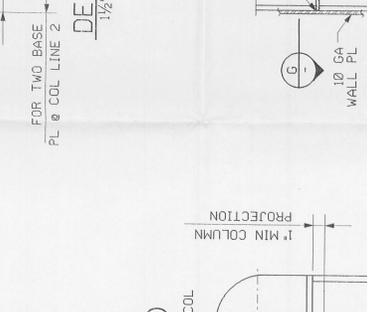
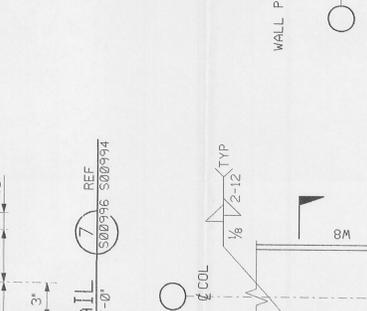
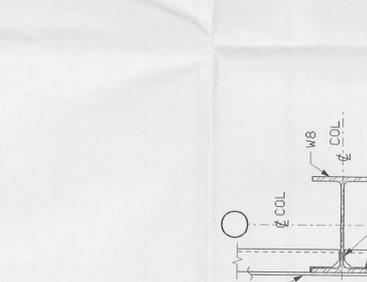
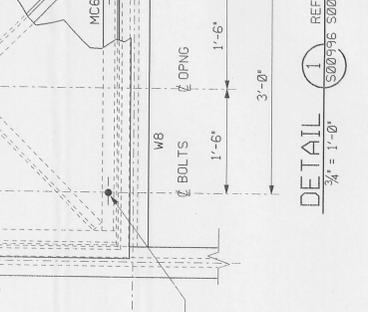
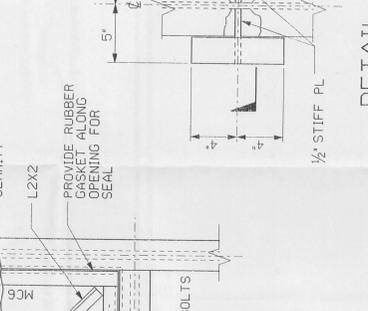
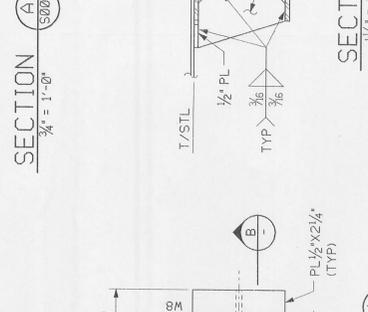
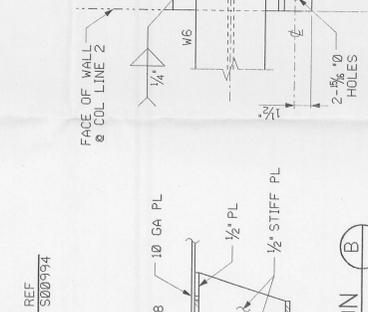
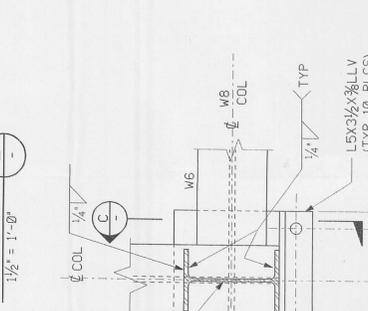
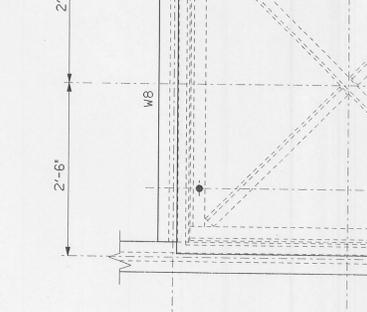
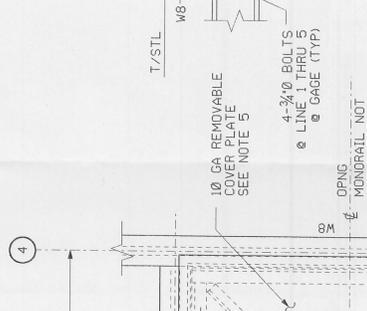
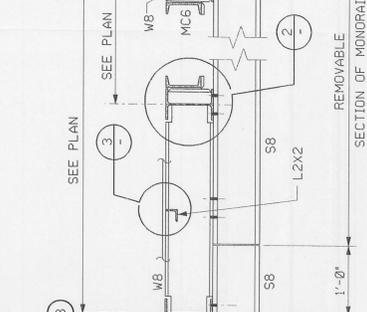
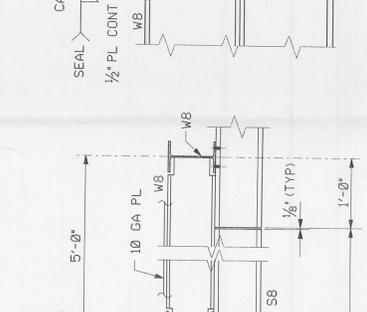
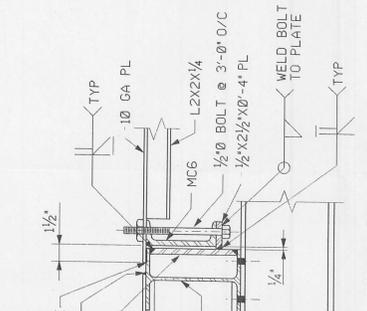
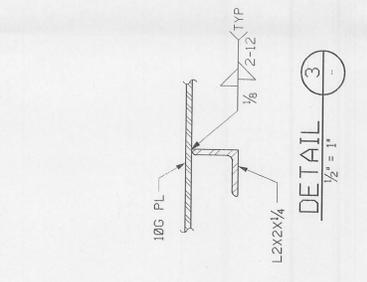


ELEVATION AT COL LINE 1



ELEVATION AT COL LINE 5

1. FOR GENERAL STEEL NOTES, SEE DRAWING 94X-5900-S-009793.
2. DETAIL 8 FOR LIFTING LUG IS FOR GENERAL CONCEPT ONLY. FABRICATOR SHALL SUBMIT LIFT LUG DESIGN WITH ERECTION AND TRANSPORTATION PLAN.
3. ANCHOR PLATES, LEVELING PLATES AND ANCHOR BOLTS SHALL BE SUPPLIED AND INSTALLED BY FOUNDATION CONTRACTOR.
4. ADDITIONAL DESIGN DETAILS FOR THE ACCESS PANEL WILL BE DEVELOPED DURING TITLE II DESIGN OF THE RESIDUE RETRIEVAL SYSTEM.



PRELIMINARY  
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A-E	FERMO	DATE	INITIALS AND DATE
C	ISSUED FINAL FOR EPA REVIEW		N/A		
B	ISSUED PRE-FINAL FOR EPA REVIEW		N/A		
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  
SILO SUPERSTRUCTURE DESIGN  
DRAWING TITLE  
SILOS PROJECT

STRUCTURAL INFORMATION ONLY  
SECTIONS AND DETAILS ENCLOSURE  
DATE: 4/05/96  
CHECKED BY: G. R. HALKER  
SCALE: AS NOTED  
CLASS: 40200

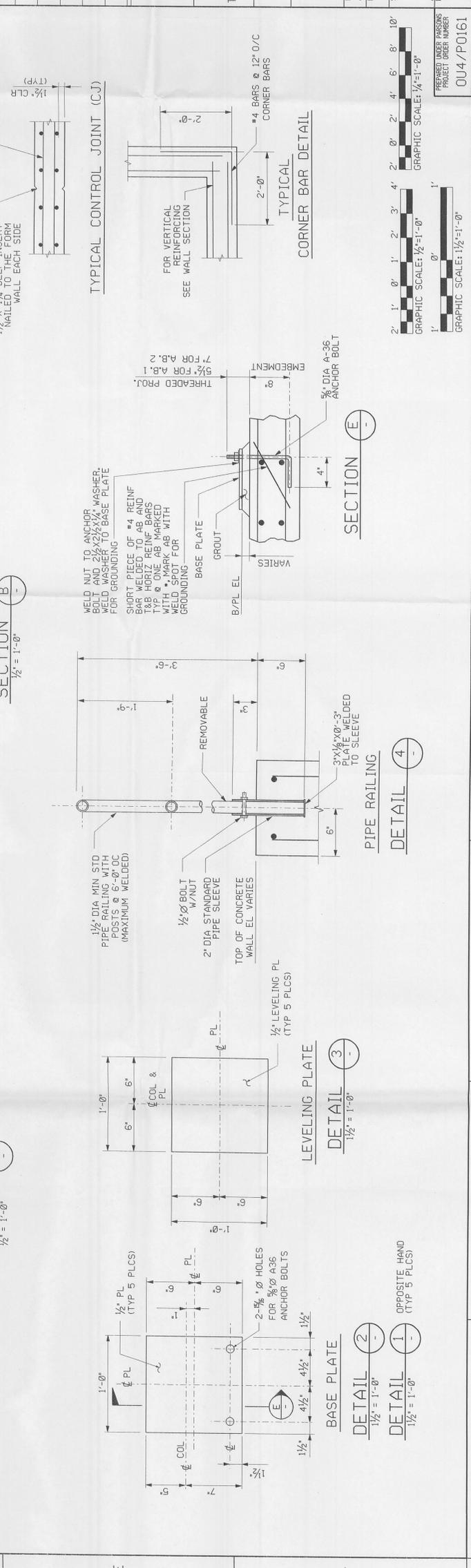
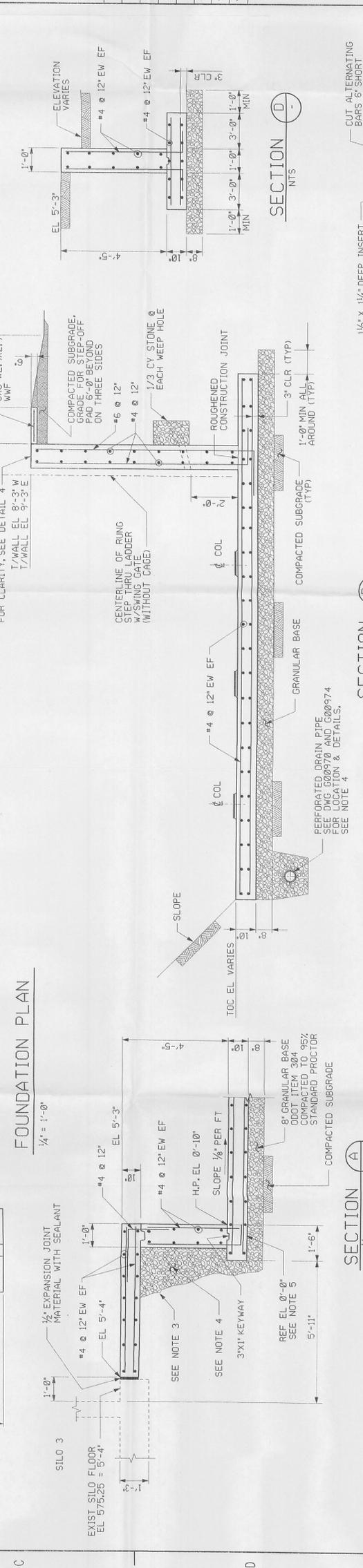
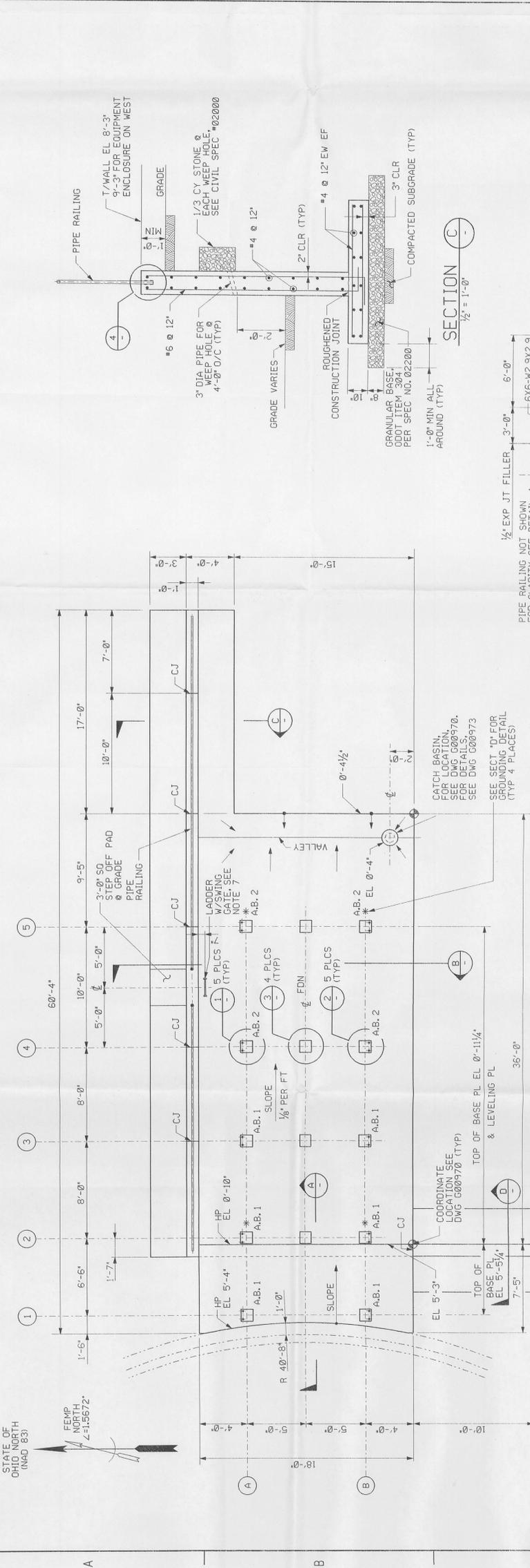
DATE: 4/05/96  
DRAWING INDEX NO.: 94X-5900-S-00996  
PROJECT NO.: 94X-5900-S-00996  
SHEET NO.: 00200

DATE: 4/05/96  
DRAWING INDEX NO.: 94X-5900-S-00996  
PROJECT NO.: 94X-5900-S-00996  
SHEET NO.: 00200

DATE: 4/05/96  
DRAWING INDEX NO.: 94X-5900-S-00996  
PROJECT NO.: 94X-5900-S-00996  
SHEET NO.: 00200

PREPARED UNDER PARSONS PROJECT ORDER NUMBER  
004/P0161

- FOR GENERAL CONCRETE NOTES, SEE DRAWING 94X-5900-S-00991.
- FOUNDATION DESIGN IS BASED ON PRELIMINARY SOIL BEARING CAPACITY OF 3000 PSF.
- EXCAVATION FOR WALL AND SLAB NEAR SILO TO BE DONE WITH EXTREME CARE AND UNDER SUPERVISION OF LICENSED CIVIL ENGINEER. SUPERVISION PROVIDE TEMPORARY SHORING AS REQUIRED.
- FILL WITH ODOT ITEM 703, NO. 8 AGGREGATE FOR BACKFILL BEHIND WALL-WEEP HOLE AND PERFORATED DRAIN PIPE PER SPECIFICATION NO. 02200.
- REF EL 0'-0" = ELEV 569.92 (BOTTOM OF FTG AT WALL).
- ANCHOR BOLTS, BASE PLATES, AND GROUT ARE INSTALLED BY FOUNDATION CONTRACTOR.
- FOR LADDER DETAILS, SEE DRAWING 94X-5900-S-00990.



**PRELIMINARY**  
NOT FOR CONSTRUCTION

REV. NO.	ISSUE OR REVISION PURPOSE - DESCRIPTION	A/E	FORMG.	DATE
C	ISSUED FINAL FOR EPA REVIEW	N/A		
B	ISSUED PRE-FINAL FOR EPA REVIEW	N/A		
A	ISSUED FOR 50% DESIGN REVIEW	N/A		

UNITED STATES  
DEPARTMENT OF ENERGY  
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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

PROJECT NAME  
SILO SUPERSTRUCTURE DESIGN  
SILOS PROJECT

DATE  
3-4-96

LEAD ENGINEER  
G. R. HACKER

CHECKED BY  
G. R. HACKER

DATE  
4/02/96

SCALE  
AS NOTED

FLOOR  
N/A

PROJECT NO.  
40200

DATE  
00-90701

DRAWING INDEX CODE NO.  
94X-5900-S-00997

SHEET NO.  
S0021

REV. NO.  
C

