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Project Manual

2005
Improvements

KY Highway 146
Tank

Oldham County
Water District
Buckner, KY

August 2005

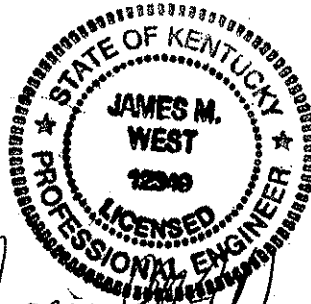


PLAN HOLDER: Oldham Co. Water District

Set No.: 1

PROJECT MANUAL

CONTRACT 1-2005
2005 IMPROVEMENTS
KENTUCKY HIGHWAY 146 TANK
OLDHAM COUNTY WATER DISTRICT
BUCKER, KENTUCKY



James M. West
August 15, 2005

Prepared by:

STRAND ASSOCIATES, INC.®
629 Washington Street
Columbus, IN 47201
www.strand.com

August 2005



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OLDHAM COUNTY WATER DISTRICT
2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for
OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

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ADVERTISEMENT FOR BIDS

Separate sealed BIDS for the construction of:

2005 IMPROVEMENTS: KENTUCKY HIGHWAY 146 TANK

will be received by the Oldham County Water District until 1:30 p.m. (LOCAL TIME), on November 22, 2005, and then at said office publicly opened and read aloud. Proposals received after said hour may be returned unopened. Bids to be opened at 1:30 p.m. (LOCAL TIME) on November 22, 2005 at the Oldham County Water District's office at 3711 West Highway No. 146, Buckner, Kentucky.

Proposals may be forwarded by registered mail and addressed to Mr. Phillip Ward, Superintendent, Oldham County Water District, P.O. Box 51, 3711 W. Highway No. 146, Buckner, Kentucky 40010, and plainly labeled "Sealed Proposal for Kentucky Highway 146 Tank."

A pre-bid meeting will be held at 1:00 p.m., local time, on November 15, 2005, at the office of the Oldham County Water District. All prime contractors, subcontractors, small minority or women owned enterprises, and other interested parties are invited to attend.

The Information for Bidders, Bid Forms, Contract Forms, Plans, Construction Specifications and forms of Bid Bond, Performance Bond and Payment Bond and other Contract Documents may be examined at the following:

- Strand Associates, Inc., 629 Washington St., Columbus, IN 47201
- Oldham County Water District, 3711 W. Highway 146, Buckner, KY 40010
- Builders Exchange of Louisville, 2300 Meadow Drive, Louisville, KY 40218
- McGraw Hill Construction, Dodge Office, 6666 East 75th Street, Suite 199, Indianapolis, IN 46250
- Reed Construction Data, 30 Technology Parkway South, Suite 500, Norcross, GA 30092

Copies of the complete bidding documents and plans for each separate project may be obtained at the office of the Engineer, Strand Associates, Inc. located at 629 Washington Street, Columbus, Indiana 47201, for the price specified as follows:

Kentucky Highway 146 TANK ----- \$ 150.00

Any BIDDER, upon returning said drawings and specifications, in good condition, along with Bid or promptly after bid opening, will be refunded \$0.00. Any non-bidder, (i.e., not submitting prime bid on the prescribed form) upon so returning said bidding documents, drawings and specifications will be refunded \$0.00.

Each bidder must deposit with his bid, security in the amount of 5% of the highest aggregate proposal in the form of a certified check or bid bond made payable to the Oldham County Water District.

No Bidder may withdraw his proposal within 90 days after the actual date of the opening thereof.

Each sealed proposal envelope must indicate the title of the project, the Bidder's name and address, and the Division(s) being bid.

Proposals for Bidders shall be executed on the forms provided by the Engineer.

The Owner reserves the right to waive any informality or reject any or all Bids.

The estimated cost of construction for the project is as follows:

Kentucky Highway 146 TANK ----- \$2,300,000.00

Board of Commissioners
Oldham County Water District

Gus Daeuble, Chairman
Date: October 21, 2005

INFORMATION FOR BIDDERS

BIDS will be received by the Oldham County Water District (herein called the "OWNER"), at the Oldham County Water District Office until 1:30 p.m. (LOCAL TIME) on November 22, 2005.

Each BID must be submitted in a sealed envelope, addressed to the Oldham County Water District, 3711 W. Highway 146 at Buckner, Kentucky. Each sealed envelope containing a BID must be plainly marked on the outside as BID for 2005 Improvements, Kentucky Highway 146 Tank and the envelope should bear on the outside the name of the BIDDER, his address, his license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at P.O. Box 51, Buckner, Kentucky 40010, Attention: Phillip Ward, Superintendent.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 90 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID bond payable to the OWNER for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and BOND forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his option consider the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER within ten (10) days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within ten (10) days of the execution of the Agreement by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carryout the obligations of the Agreement and to complete the WORK contemplated herein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended.

The low BIDDER shall supply the names and addresses of major material SUPPLIERS and SUBCONTRACTORS when requested to do so by the OWNER.

Inspection trips for prospective BIDDERS will leave from the office of the Oldham County Water District, 3711 W. Highway 146, Buckner, Kentucky AS REQUESTED.

The ENGINEER is Strand Associates, Inc. His address is 629 Washington Street, Columbus, Indiana 47201, telephone number (812)372-9911.

SUPPLEMENTARY INFORMATION FOR BIDDERS

1. APPLICATION

The purpose of this Supplementary Information for Bidders is to amplify the foregoing Information for Bidders and it is not intended that they shall supersede any of the requirements therein except as specifically hereinafter stated.

2. DEFINITIONS

Wherever in these contract documents and specifications the words "provide", "provided" or "providing" are written, they shall be interpreted to read "furnish and install", "furnished and installed" and "furnishing and installing", respectively.

3. COMPLETENESS OF SPECIFICATIONS AND PLANS

Upon issue to prospective bidders, the physical make-up and content of the plans, specifications, and extra proposal forms are intended to be complete for preparing and submitting of proposals. However, the bidder shall verify his own satisfaction that all material issued him is complete. Should he discover that a page, sheet, etc., is missing, he shall notify the Engineer in writing and it will be forwarded to him. After bids have been submitted, no claims of ignorance of the requirements of bidding or of construction due to such missing material will be recognized.

4. INSURANCE

The Contractor shall include in his bid price, or prices, the cost of all insurance set forth in the "General Conditions" and "Supplemental General Conditions".

Contractor shall provide insurance such that specified aggregate amounts for General Liability and Property damage are available for this specific project.

Contractor shall require Sub-Contractors, if any, not protected under Contractor's insurance policies to take out and maintain insurance in the same amounts as required of the Contractor. It is the intent of this action that the Contractor completely protect the Owner from damage suits resulting from Contractor's negligence.

5. EXAMINATION OF BIDDERS

Bidders shall carefully examine the entire site of the work and adjacent premises and the various means of approach to the site(s) and shall make all necessary investigations to inform themselves thoroughly as to the facilities for delivering, placing, and operating the necessary construction system, and the facilities for delivering and installing the equipment specified and for handling the materials at the site, and to inform themselves thoroughly as to all the difficulties that may be encountered in the complete execution of all work under the attached contracts, in accordance with the specifications and drawings.

Bidders are also required to examine the Contract Documents, Specifications, and Plans and any other data which may be on file in the office of the Engineer, for examination of bidders. No plea of ignorance of conditions that exist, or of condition of the work under this contract, as a result of failure to make the necessary examinations and investigations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every detail the requirements of said contract, specifications and drawings or will be accepted as basis for any claim whatsoever for extra compensation.

Upon application, all available information in the possession of the Engineer will be shown to the bidders, but the correctness of any such information is not guaranteed.

6. LOCAL FEATURES

The character and location of existing structures above and underground are not necessarily, entirely, or accurately shown on the plans, but are a matter of investigation by the Contractor, and such as are shown are merely indicative or typical of the nature of some of the existing structures which the Contractor may expect to observe or encounter.

It is expressly understood that no attempt has been made to show all underground objects on the plans, and that, if any such objects are indicated, their location and character is not necessarily known to be even approximately correct.

7. EXCAVATION CLASSIFICATIONS

Excavation is unclassified as set forth in Section 02215 of the construction specifications.

SPECIAL CONDITIONS

1. EXISTING UNDERGROUND UTILITIES

Existing underground utilities may consist of gas lines, water lines, sewer lines and buried telephone and electrical cables. These utilities are not completely located on the plans. The Contractor shall be responsible for determining the location of all underground utilities.

2. LOCAL ELECTRIC POWER

Electric power is available at the various sites shown on the plans, however, in order to insure that phase and voltage are correct, the Contractor is instructed to contact the local power company serving the specified area and re-check the power supply before submission of shop drawings for equipment requiring electric power.

3. CONTRACT DESCRIPTIONS, COMPLETION TIME AND LIQUIDATED DAMAGES

The project contemplated by these plans and specifications has one (1) Division of Work to be completed on a furnish-and-install basis. Nothing within these contract documents shall be interpreted to relieve the Contractor from any responsibility for the storage, handling and protection of any and all materials and equipment, etc., which is required by the Bid Documents to be performed under the contract including furnishing and installing, but not limited to the following:

Kentucky Highway 146 Tank

This Contract consists generally of furnishing and installing a 2,000,000 gallon composite elevated water storage tank and appurtenances. Construction includes, but is not limited to: concrete structures, shop steel fabrication, piping, steel erection, painting, site work, chain link fence, disinfection, flushing and etc., complete, all in accordance with the Engineer's plans, specifications and Bid Forms.

All work shall be completed in 365 calendar days from the Notice to Proceed.

The amount of liquidated damages shall be \$1,000.00 per calendar day.

In addition to liquidated damages, the Contractor shall reimburse the OWNER for all additional costs incurred by the ENGINEER for providing Resident Observation for the Project after the allotted time for completion of work has expired.

4. SPECIAL REQUIREMENTS

Contractor shall conform to applicable Kentucky State Highway Commission Department of Transportation requirements, construction and material specifications, all applicable Oldham County Board of Health requirements and all applicable County Highway Department requirements.

5. SITE ENTRANCE

The site entrance may be over a CSX Railroad crossing. The Contractor shall comply with all CSX requirements for use of the crossing. No vehicles or equipment shall stop or be parked on the crossing without approval of CSX. This section of CSX Railroad is used frequently and a flagger may be required at the expense of the Contractor. If alternate access is made available, it should be used whenever possible.

6. WATER FOR TESTING

The Contractor requiring water to flush, test and sterilize shall coordinate their requirements with Oldham County Water District when using them as a source of water. All contractors shall be financially responsible to the supplier for the cost of providing the water. Cost of water shall be included in Contractor's total base bid price for installing the facilities. The Contractors' cost of water for flushing, testing and disinfection operations shall be \$1.50/1,000 gallons.

7. STAKES AND INSTRUCTIONS

The Contractor shall provide personnel to assist the Engineer's representative in locating any and all mains, tanks, equipment, buildings and in making measurements of completed work required for this project. All measured quantities shall be agreed to in writing by both parties prior to submittal for payment. The Contractor shall also furnish all hubs, nails, flags, and all appurtenances necessary to make all stakeouts and measurements required. The Engineer will provide a bench mark circuit and base line for vertical and horizontal control where required.

8. RECORD DRAWING INFORMATION

It shall be the responsibility of the Construction Observer, whether employed by the Engineer or the Owner, to submit to the Engineer a monthly list of record drawing information. The list shall be compiled by the Construction Observer with the aid of the Contractor and shall be submitted with the Contractor's monthly Partial Payment Estimate.

9. HISTORICAL PRESERVATION

If any archaeological material (skeletal, ceramic or lithic) features or sites are encountered during construction activities the project engineer or his representative shall immediately notify the Kentucky Historic Preservation office at (502-564-7005).

It shall be the responsibility of the Construction Observer, whether employed by the Owner or Engineer, to observe the excavation and construction and notify the Project Engineer and Contractor of any suspected historic feature.

The cooperation of each Contractor (and any subcontractor) is requested by the Oldham County Water District to fulfill their commitment in this regard.

Any delay or additional work caused or created due to the stopping of construction for Historical Investigation shall be reviewed and considered in accordance with the General Conditions; specifically Sections 13 and 14 covering changes in work.

10. CONSTRUCTION PROCEDURE AND PRIORITY

The Contractor shall submit a schedule for installation of all equipment and completion of all work included in the various trades in the respective division, to the Engineer, for review and acceptance prior to commencing work.

11. CONSTRUCTION WITHIN STATE, COUNTY OR TOWNSHIP ROAD RIGHTS-OF-WAY

The Owner shall provide all special drawings for permit applications and approvals for construction within State, County, or Township Road Rights-of-Way.

It shall be the Contractor's responsibility, prior to construction and installation of water mains, within any State, County or Township Road Rights-of-Way, to verify that the governing agency has issued to the Owner necessary permits and approval for construction within the road rights-of-way. The Contractor shall also comply with all requirements and specifications of such governing agencies.

The Contractor shall have in his possession or have access to, at all times, a copy of the necessary permit(s), approval(s), and drawing(s), when working within the State, County, or Township Road Rights-of-Way.

All work performed and material and equipment furnished to complete the construction required within State Highway right-of-way as indicated on the Engineer's plans shall comply with the requirements of Kentucky Division of Transportation, Bureau of Highways. When the Contractor cuts or damages the existing State road surface, surface restoration shall be in accordance with Kentucky Department of Transportation, Bureau of Highways.

When working in the highway rights-of-way, the Contractor shall include in his price for crossing and/or paralleling said highways, all work necessary in the right-of-way including grading and seeding as outlined in the specifications and the bid proposal.

12. ENVIRONMENTAL IMPACT MITIGATION MEASURES

Normal construction shall be limited to daylight hours to minimize disturbance from noise and lights.

Contractor shall control all unnecessary noise.

Contractor shall control dust by wetting down or use of chemicals when necessary or requested by the Engineer.

Contractor shall provide temporary siltation control by minimizing disturbed areas and providing prompt temporary seeding, temporary sediment basin, straw bale barrier and silt fence where needed or requested by the Engineer.

Contractor shall provide permanent erosion control through suitable site drainage and finish grading, seeding, sodding and other structural erosion control measures as shown on the plans, specified herein or as necessary.

All disturbed areas including pipeline construction areas shall be restored to preconstruction conditions.

Contractor shall comply with all applicable OSHA and KDOT safety standards and regulations.

Contractor shall provide temporary sanitary facilities as specified and/or as required.

Contractor shall be in compliance with all Kentucky EPA and health department requirements.

Any wetlands that are crossed during construction shall have the existing surface elevations restored and existing surface material, including topsoil, plant roots, seeds, etc., shall be placed on top of the trench to promote regrowth of aquatic vegetation. No granular material shall be used in the pipe trench.

13. FITTINGS

All fittings used in this project shall be Class 350 ductile iron compact fittings (AWWA C153) with mechanical joint ends.

13. BASIS OF AWARD

The Contracts will be awarded to the lowest responsive, responsible bidder.

The lowest bidder will be determined by the lowest total bid.

15. BID PROPOSAL FORMS

The bid proposal must be properly and completely executed and submitted on the separate forms furnished by the Engineer.

Bids which are not signed by the individuals making the bid must have power of attorney attached.

The Owner reserves the right to adjust any and all quantities or delete any items set out in the Bid Proposal forms prior to awarding a contract. The Contractor shall make no claim to extra compensation for the reduction in the contract amount necessitated by the reduction in quantities.



Ernie Fletcher
Governor

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET
DEPARTMENT OF LABOR
OFFICE OF WORKPLACE STANDARDS
1047 US Hwy 127 S STE 4
Frankfort, Kentucky 40601
Phone: (502) 564-3070
www.kylabor.net

LaJuana S. Wilcher
Secretary

Philip J. Anderson
Commissioner

Christopher H. Smith
Executive Director

October 24, 2005

Jim McNulty
Strand Associates, Inc.
629 Washington Street
Columbus IN 47201

Re: Oldham County Water District, Kentucky Highway 146 Water Tank

Advertising Date as Shown on Notification: October 31, 2005

Dear Jim McNulty:

This office is in receipt of your written notification on the above project as required by KRS 337.510 (1).

I am enclosing a copy of the current prevailing wage determination number CR-1-026, dated May 18, 2005 for OLDHAM County. This schedule of wages shall be attached to and made a part of the specifications for the work, printed on the bidding blanks, and made a part of the contract for the construction of the public works between the public authority and the successful bidder or bidders.

The determination number assigned to this project is based upon the advertising date contained in your notification. There may be modifications to this wage determination prior to the advertising date indicated. In addition, if the contract is not awarded within 90 days of this advertising date or if the advertising date is modified, a different set of prevailing rates of wages may be applicable. It will be the responsibility of the public authority to contact this office and verify the correct schedule of the prevailing rates of wages for use on the project. Your project number is as follows: 093-H-00118-05-1, Heavy/Highway

Sincerely,

John Fitzpatrick
Prevailing Wage Specialist

KENTUCKY DEPARTMENT OF LABOR
PREVAILING WAGE DETERMINATION
CURRENT REVISION
LOCALITY 26

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES

Determination No. CR-1-26 2005

Date of Determination: May 18, 2005

Project No. 093-H-00118-05-1 Type: ___ Bldg <u>XXX</u> HH
--

This schedule of the prevailing rate of wages for Carroll, Henry, Oldham & Trimble Counties have been determined in accordance with the provisions of KRS 337.505 to 337.550. This determination shall be referred to as Prevailing Wage Determination No. CR-1-26 2005.

Apprentices shall be permitted to work as such subject to Administrative Regulations adopted by the Executive Director of Workplace Standards. Copies of these regulations will be furnished upon request to any interested person.

Overtime is to be computed at not less than one and one-half (1 1/2) times the indicated BASE RATE for all hours worked in excess of eight (8) per day, and/or in excess of forty (40) per week. However, KRS 337.540 permits an employee and employer to agree, in writing, that the employee will be compensated at a straight time base rate for hours worked in excess of eight (8) hours in any one calendar day, but not more than ten (10) hours worked in any one calendar day, if such written agreement is prior to the over eight (8) hours in a calendar day actually being worked, or where provided for in a collective bargaining agreement. The fringe benefit rate is to be paid for each hour worked at a straight time rate for all hours worked.

Fringe benefit amounts are applicable for all hours worked except when otherwise noted. Welders will receive rate for craft in which welding is incidental.

NOTE: The type of construction shall be determined by applying the following definitions:

BUILDING CONSTRUCTION

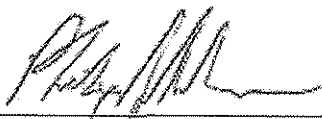
Building construction is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level, as well as incidental grading, utilities and paving.

HIGHWAY CONSTRUCTION

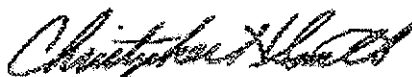
Highway construction includes the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction. It includes all incidental construction in conjunction with the highway construction project.

HEAVY CONSTRUCTION

Heavy projects are those projects that are not properly classified as either "building" or "highway". For example, dredging projects, water and sewer line projects, dams, flood control projects, sewage treatment plants and facilities, and water treatment plants and facilities are considered heavy.



Philip J. Anderson, Commissioner
Kentucky Department of Labor



Christopher H. Smith, Executive Director
Office of Workplace Standards
Kentucky Department of Labor

Ratified September 28, 2005

Determination No. CR-1-26 2005



CLASSIFICATIONSRATE AND FRINGE BENEFITS**CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:****ASBESTOS/INSULATION WORKERS:**

Asbestos/Insulation Workers: (Includes application of all insulating materials, protective coverings, coatings & finishing to all types of mechanical systems):

BASE RATE	\$22.72
FRINGE BENEFITS	9.75

Hazardous Material Handler ((Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems):

BASE RATE	\$14.80
FRINGE BENEFITS	5.70

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:**BOILERMAKERS:**

BASE RATE	\$31.29
FRINGE BENEFITS	15.67

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:**BRICKLAYERS:**

Bricklayers, Caulkers, Cleaners, Pointers & Stonemasons:

BASE RATE	\$21.53
FRINGE BENEFITS	7.20

Layout man & Sawman:

BASE RATE	\$21.78
FRINGE BENEFITS	7.20

Refractory & Acid Brick:

BASE RATE	\$22.03
FRINGE BENEFITS	7.20

Marble Setters, Terrazzo Workers & Tile Setters:

BUILDING

BASE RATE	\$20.54
FRINGE BENEFITS	4.60

Marble Terrazzo & Tile Finishers: BUILDING

BASE RATE	\$14.24
FRINGE BENEFITS	3.95

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:**CARPENTERS:**

Carpenters:

BUILDING

BASE RATE	\$20.00
FRINGE BENEFITS	8.17

HEAVY & HIGHWAY

BASE RATE	\$22.85
FRINGE BENEFITS	7.23

CLASSIFICATIONSRATE AND FRINGE BENEFITS**CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:**

CARPENTERS (Continued):

Piledrivermen:	BUILDING	BASE RATE	\$20.25
		FRINGE BENEFITS	8.17
	HEAVY & HIGHWAY	BASE RATE	\$23.10
		FRINGE BENEFITS	7.23
Divers:	HEAVY & HIGHWAY	BASE RATE	\$34.65
		FRINGE BENEFITS	7.23

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

CEMENT MASONS:	BUILDING	BASE RATE	\$18.50
		FRINGE BENEFITS	7.90

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

ELECTRICIANS:

Electricians:	BASE RATE	\$25.75
	FRINGE BENEFITS	9.52

LINE CONSTRUCTION:

Cable Splicer:	BASE RATE	\$26.75
	FRINGE BENEFITS	7.90

Equipment Operator A: John Henry Rock Drill, D6 (or equivalent) and above, Trackhoe Digger, Cranes (greater than 25 tons and less than 45 tons)	BASE RATE	\$23.63
	FRINGE BENEFITS	7.41

Equipment Operator B: Cranes (6-25 tons), Backhoes, Road Tractor, Dozer up to D5, Pressure Digger-Wheeled or Tracked, all Tension Wire Stringing Equipment	BASE RATE	\$21.00
	FRINGE BENEFITS	7.16

Equipment Operator C: Trencher, Vibratory Compactor, Ground Rod Driver, Boom Truck (6 ton or below), Skid Steer Loaders	BASE RATE	\$17.06
	FRINGE BENEFITS	6.39

Groundman	BASE RATE	\$19.69
	FRINGE BENEFITS	6.80

Lineman and Technician	BASE RATE	\$26.25
	FRINGE BENEFITS	7.82

Cranes 45 tons or larger paid 100% of journeyman lineman's rate.

CLASSIFICATIONS

RATE AND FRINGE BENEFITS

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

ELEVATOR MECHANICS:	BASE RATE	\$25.755
	FRINGE BENEFITS	7.455

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

GLAZIERS:	BASE RATE	\$22.49
	FRINGE BENEFITS	7.86

CARROLL (Eastern third, including the Town of Ghent) COUNTY:

IRONWORKERS:

Reinforcing: Beyond 30-mile radius of Hamilton County, OH Courthouse	BASE RATE	\$22.96
	FRINGE BENEFITS	10.47

Up to and including 30-mile radius of Hamilton County, OH Courthouse	BASE RATE	\$22.71
	FRINGE BENEFITS	10.47

Ornamental; Structural:	BASE RATE	\$24.00
	FRINGE BENEFITS	11.58

Fence Erector:	BASE RATE	\$22.05
	FRINGE BENEFITS	11.58

CARROLL (Western two-thirds, including Townships of Carrollton, Easterday, English, Locust, Louis, Prestonville & Worthville), HENRY, OLDHAM & TRIMBLE COUNTIES:

IRONWORKERS:

Structural, Ornamental, Reinforcing, Precast Concrete Erectors:	BASE RATE	\$23.91
	FRINGE BENEFITS	12.20

OLDHAM COUNTY:

LABORERS/BUILDING:

GROUP 1:

General, Carpenter Tender, Cement Finisher Tender, Placing of Concrete, Wrecking of Buildings, Hand Digging & Hand Backfilling of Ditches, Clearing of Rights-of-Way & Building Sites, Curing of Concrete, Application Hardener, Handling of Chemically Treated Lumber, Installing of Wood Sheeting & Shoring, Signal Laborer, Concrete Bucket & Masonry work, Cleaning & Moving of General Purpose Materials, General Cleanup of Scrap & Debris:

BUILDING	BASE RATE	\$15.12
	FRINGE BENEFITS	6.68

CLASSIFICATIONSRATE AND FRINGE BENEFITS**OLDHAM COUNTY:**

LABORERS/BUILDING (Continued):

GROUP 2:

Mason Tender, Side Rail Setter (Metal), Stackman, Fork Lift Operator (Masonry & Plastering Contractors Only), Power Driven Georgia Buggy, Chain Saw, Vibrator Operator, Mesh Handler, Power Tools (Air, Diesel, Electric, Gasoline), Wagon Drill, Pipe Layer, Wall Man, Treatment of Exposed Concrete (Chip, Bush Hammer & Rub), Concrete Saw, Gasoline Tamper Machine, Walk Behind Trenching Machine, Burner Man, Joint Maker, & Asphalt Raker, & Mobile Sweeper:

BUILDING	BASE RATE	\$15.32
	FRINGE BENEFITS	6.68

GROUP 3:

Air Track Driller, Introflax Burning Rod, Gunnite Nozzle Man Operator, Sewer, Tunnel Laborer (Free Air), & Sand Hog or Mucker (Free Air):

BUILDING	BASE RATE	\$15.52
	FRINGE BENEFITS	6.68

GROUP 4:

Holeman Drilled Piers, Augured Caissons, Sand Miner (Tunnel Free Air), Caisson Workers, & Powderman:

BUILDING	BASE RATE	\$16.12
	FRINGE BENEFITS	6.68

GROUP 5:

Tunnel Person & Tunnel Miner (Pressure & Free Air), Environmental Worker, Toxic & Hazardous Waste, Asbestos Removal:

BUILDING	BASE RATE	\$16.62
	FRINGE BENEFITS	6.68

Free Hanging Scaffold above 30' receives \$.25 Premium on all of the above

CARROLL, HENRY & TRIMBLE COUNTIES:

LABORERS/BUILDING:

GROUP 1:

Asbestos Abatement, Carpenter Tender, General, Concrete Pouring & Curing, Concrete Form Stripping & Wrecking, Hand Digging & Backfilling of Ditches, Clearing of Right-of-ways & Building Sites, Wood Sheeting & Shoring, Signalperson for Concrete Bucket, General Cleaning, Toxic Waste Removal, & Environmental Laborer – Nuclear, Radiation, Toxic & Hazardous Waste Level D:

BUILDING	BASE RATE	\$17.33
	FRINGE BENEFITS	6.58

GROUP 2:

Air Tool Operator, Air Track Drill, Asphalt Raker, Tamper, Batch Plant & Scale Man, Chain Saw, Concrete Saw, Electric Hand Grinder, Electric Bush & Chipping Hammer, Flagperson, Forklift Operator, Form Setter (Street or Highway), Gunnite, Hand Spiker, Introflax Burning Rod, Joint Maker, Mason Tender, Pipelayer, Plasterer Tender, Power Driven Georgia Buggy, Power Posthole Digger, Railroad, Sandblaster, Scow Man & Deck Hand, Signalperson, Sweeper & Cleaner Machine, Vibrator Operator, Walk Behind Trenching Machine, Mortar Mixer Machine, Water Pumpman, Metal Form Setter, Heater, Mesh Handler on walkways, Streets & Roadways (Outside Buildings), & Environmental Laborers – Nuclear, Radiation, Toxic & Hazardous Waste – Level C:

BUILDING	BASE RATE	\$17.73
	FRINGE BENEFITS	6.58

CLASSIFICATIONS

RATE AND FRINGE BENEFITS

CARROLL, HENRY & TRIMBLE COUNTIES:
LABORERS/BUILDING (Continued):

GROUP 3:

Gunnite Nozzleman & Gunnite Nozzle Machine Operator, Sand Blaster Nozzleman, Concrete or Grout Pumpman, & Plaster Pumpman:

BUILDING	BASE RATE	\$17.93
	FRINGE BENEFITS	6.58

GROUP 4:

Powderman & Blaster, & Environmental Laborer – Nuclear, Radiation, Toxic & Hazardous Waste – Level B:

BUILDING	BASE RATE	18.03
	FRINGE BENEFITS	6.58

GROUP 5:

Caisson Hole (6 ft & over – Pressure & Free Air Including Tools), Construction Specialist, & Environmental Laborer – Nuclear, Radiation, Toxic & Hazardous Waste – Level A:

BUILDING	BASE RATE	\$18.53
	FRINGE BENEFITS	6.58

GROUP 6:

Tunnel Man & Tunnel Sand Miner, Cofferdam (Pressure & Free Air), & Sand Hog or Mucker (Pressure or Free Air):

BUILDING	BASE RATE	\$18.83
	FRINGE BENEFITS	6.58

CARROLL, HENRY, OLDHAM & TRIMBLE

LABORERS: HEAVY HIGHWAY:

GROUP 1:

Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental – Nuclear, Radiation, Toxic & Hazardous Waste – Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; & Wrecking of Concrete Form:

HEAVY & HIGHWAY	BASE RATE	\$17.43
	FRINGE BENEFITS	8.38

GROUP 2:

Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Burner & Welder; Bushhammer; Chain Saw Operator; Hand Held or Walk Behind Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental – Nuclear, Radiation, Toxic & Hazardous Waste – Level C; Forklift Operator for Masonry; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; & Wagon Driller:

HEAVY & HIGHWAY	BASE RATE	\$17.68
	FRINGE BENEFITS	8.38

CLASSIFICATIONS

RATE AND FRINGE BENEFITS

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES

LABORERS: HEAVY HIGHWAY (Continued):

GROUP 3:

Air Truck Driller; Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Powderman & Blaster; Side Rail Setter; Rail Paved Ditch; Screw Operator; Tunnel (Free air); & Water Blaster:

HEAVY & HIGHWAY	BASE RATE	\$17.73
	FRINGE BENEFITS	8.38

GROUP 4:

Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air):

HEAVY & HIGHWAY	BASE RATE	\$18.33
	FRINGE BENEFITS	8.38

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

MILLWRIGHTS:

	BASE RATE	\$22.90
	FRINGE BENEFITS	11.65

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

OPERATING ENGINEERS/BUILDING:

CLASS A:

Auto Patrol, Batcher Plant, Bituminous Paver, Cableway, Central Compressor Plant, Clamshell, Concrete Mixer (1 cu. ft. or over), Concrete Pump, Crane, Crusher Plant, Derrick, Derrick Boat, Ditching & Trenching Machine, Dragline, Dredge Operator, Dredge Engineer, Elevating Grader & Loader, Hoe Type Machine, Hoist (1 drum when used for stack or chimney construction or repair), Hoisting Engine (2 or more Drums), Locomotive, Motor Scrapper, Carry-All Scoop, Bulldozer, Mechanic, Orangepeel Bucket, Piledriver, Power Blade, Motor Grader, Roller (Bituminous), Scarifier, Shovel, Tractor Shovel, Truck Crane, Winch Truck, Push Dozer, Highlift, Boom Cat, Core Drill, Hopto, Tow or Push Boat, A-Frame Winch Truck, Concrete Paver, Gradeall, Hoist, Hyster, Pumpcrete, Ross Carrier, Boom, Tail Boom, Rotary Drill, Hydro Hammer, Mucking Machine, Rock Spreader (Attached to Equipment), Scoopmobile, KeCal Loader, Tower Crane (French, German & Other Types), Hydrocrane, Backfiller, Gurry, Subgrader, Tunnel Mining Machine, including Moles, Shield or similar types of Tunnel Mining Equipment, & Forklift (Regardless of Lift Height):

BUILDING	*BASE RATE	\$21.25
	FRINGE BENEFITS	9.65

*Crane with boom 150 feet and over, including jib, shall received \$.50 above Base Rate;

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:
 OPERATING ENGINEERS/BUILDING (Continued):

CLASS B:

Air Compressor (Over 900 CFM), Bituminous Mixer, Joint Sealing Machine, Concrete Mixer (Under 21 cu. ft.), Form Grader, Roller (Rock), Tractor (50 H.P. & Over), Bull Float, Finish Machine, Outboard Motor Boat, Flexplane, Fireperson, Boom Type Tamping Machine, Greaser on Grease Facilities Servicing Heavy Equipment, Switchman or Brakeman, Whirley Oiler, Self-Propelled Compactor, Tractair & Road Widening Trencher & Farm Tractor with attachments (Except Backhoe, Highlift, & End Loader), Elevator, Hoisting Engineer (1 drum or Buck Hoist, Firebrick Masonry Excluded), Well Point, Grout Pump, Throttle Valve Person, Tugger, & Electric Vibrator Compactor:

BUILDING	BASE RATE	\$18.01
	FRINGE BENEFITS	9.65

CLASS C:

Bituminous Distributor, Cement Gun, Conveyor, Mud Jack, Paving Joint Machine, Roller (Earth), Tamping Machine, Tractor (Under 50 H.P.), Vibrator, Oiler, Concrete Saw, Burlap & Curing Machine, Truck Crane Oiler, Hydro Seeder, Power Form Handling Equipment, Deckhand Steersman, & Hydraulic Post Driver:

BUILDING	BASE RATE	\$16.74
	FRINGE BENEFITS	9.65

OPERATING ENGINEERS/HEAVY HIGHWAY:

CLASS A:

A-Frame Winch Truck; Auto Patrol; Backfiller; Batcher Plant; Bituminous Paver; Bituminous Transfer Machine; Boom Cat; Bulldozer; Mechanic; Cableway; Carry-all Scoop; Carry Deck Crane; Central Compressor Plant; Clamshell; Concrete Mixer (21 cu. ft. or Over); Concrete Paver; Truck-Mounted Concrete Pump; Core Drill; Crane; Crusher Plant; Derrick; Derrick Boat; Ditching & Trenching Machine; Dragline; Dredge Operator; Dredge Engineer; Elevating Grader & Loaders; Grade-All; Gurries; Heavy Equipment Robotics Operator/Mechanic; High Lift; Hoe-Type Machine; Hoist (Two or More Drums); Hoisting Engine (Two or More Drums); Horizontal Directional Drill Operator; Hydrocrane; Hyster; KeCal Loader; LeTourneau; Locomotive; Mechanic; Mechanically Operated Laser Screed; Mechanic Welder; Mucking Machine; Motor Scraper; Orangepeel Bucket; Piledriver; Power Blade; Pumpcrete; Push Dozer; Rock Spreader, attached to equipment; Rotary Drill; Roller (Bituminous); Scarifier; Scoopmobile; Shovel; Side Boom; Subgrader; Tailboom; Telescoping Type Forklift; Tow or Push Boat; Tower Crane (French, German & other types); Tractor Shovel; Truck Crane; Tunnel Mining Machines, including Moles, Shields or similar types of Tunnel Mining Equipment:

HEAVY & HIGHWAY	*BASE RATE	\$22.15
	FRINGE BENEFITS	10.40

CLASS B:

Air Compressor (Over 900 cu. ft. per min.); Bituminous Mixer; Boom Type Tamping Machine; Bull Float; Concrete Mixer (Under 21 cu. ft.); Dredge Engineer; Electric Vibrator; Compactor/Self-Propelled Compactor; Elevator (One Drum or Buck Hoist); Elevator (when used to Hoist Building Material); Finish Machine; Firemen & Hoist (One Drum); Flexplane; Forklift (Regardless of Lift Height); Form Grader; Joint Sealing Machine; Outboard Motor Boat; Power Sweeper (Riding Type); Roller (Rock); Ross Carrier; Skid Mounted or Trailer Mounted Concrete Pump; Switchman or Brakeman; Throttle Valve Person; Tractair & Road Widening Trencher; Tractor (50 HP or Over); Truck Crane Oiler; Tugger; Welding Machine; Well Points; & Whirley Oiler:

HEAVY & HIGHWAY	*BASE RATE	\$19.73
	FRINGE BENEFITS	10.40

CLASSIFICATIONS

RATE AND FRINGE BENEFITS

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

OPERATING ENGINEERS/HEAVY HIGHWAY (Continued):

CLASS B2:

Greaser on Grease Facilities servicing Heavy Equipment:

HEAVY & HIGHWAY	*BASE RATE	\$20.11
	FRINGE BENEFITS	10.40

CLASS C:

Bituminous Distributor; Burlap & Curing Machine; Cement Gun; Concrete Saw; Conveyor; Deckhand Oiler; Grout Pump; Hydraulic Post Driver; Hydro Seeder; Mud Jack; Oiler; Paving Joint Machine; Power Form Handling Equipment; Pump; Roller (Earth); Steersman; Tamping Machine; Tractor (Under 50 HP); & Vibrator:

HEAVY & HIGHWAY	*BASE RATE	\$19.47
	FRINGE BENEFITS	10.40

*Cranes with booms 150 ft. & over (including jib) \$.50 premium. Employees assigned to work below ground level are to be paid 10% above basic wage rate. This does not apply to open cut work.

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

PAINTERS:

Brush, Drywall Finisher – Vinyl Hanger:	BASE RATE	\$17.77
	FRINGE BENEFITS	7.02

Abrasive Blaster, Fireproofing, Lead Abatement, Spray, & Waterblasting 4000 PSI and Above:

	BASE RATE	\$18.27
	FRINGE BENEFITS	7.02

Sign Painter & Erector:	BUILDING	BASE RATE	\$17.57
		FRINGE BENEFITS	4.55

CARROLL (Eastern Half) COUNTY:

PLUMBERS & PIPEFITTERS:	BASE RATE	\$26.27
	FRINGE BENEFITS	10.49

CARROLL (Western Half), HENRY, OLDHAM & TRIMBLE COUNTIES:

PLUMBERS/PIPEFITTERS/STEAMFITTERS:	BASE RATE	\$26.31
	FRINGE BENEFITS	10.61

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

ROOFERS (excluding sheetmetal):	BASE RATE	\$18.90
	FRINGE BENEFITS	6.41

CLASSIFICATIONSRATE AND FRINGE BENEFITS**CARROLL, HENRY, & TRIMBLE COUNTIES:**

SHEETMETAL WORKERS(including metal roofs):	BASE RATE	\$27.62
	FRINGE BENEFITS	10.66

OLDHAM COUNTY:

SHEETMETAL WORKERS (including metal roofs):	BASE RATE	\$25.87
	FRINGE BENEFITS	10.66

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

SPRINKLER FITTERS:	BASE RATE	\$25.05
	FRINGE BENEFITS	11.00

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:**TRUCK DRIVERS:**

3 Tons & Under; Greaser; Tire Changer; & Mechanic Tender:

BUILDING	BASE RATE	\$17.52
	FRINGE BENEFITS	8.04

Over 3 Tons; Semi-Trailer or Pole Trailer; Dump Tandem Axles; Farm Tractor (When used to pull building material & equipment):

BUILDING	BASE RATE	\$17.63
	FRINGE BENEFITS	8.04

Concrete Mixer (Hauling on jobsites); & Truck Mechanic:

BUILDING	BASE RATE	\$17.70
	FRINGE BENEFITS	8.04

Euclid's & Other Heavy Moving Equipment; Lowboy; Winch, A-Frame & Monorail Truck (To transport building materials):

BUILDING	BASE RATE	\$17.80
	FRINGE BENEFITS	8.04

Mobile Batch Truck Tender:

HEAVY & HIGHWAY	BASE RATE	\$16.57
	FRINGE BENEFITS	7.34

Greaser, Tire Changer, & Mechanic Tender:

HEAVY & HIGHWAY	BASE RATE	\$16.68
	FRINGE BENEFITS	7.34

CARROLL, HENRY, OLDHAM & TRIMBLE COUNTIES:

TRUCK DRIVERS (Continued):

Single Axle Dump, Flatbed, Semi-trailer or Pole Trailer when used to pull building materials and equipment, Tandem Axle Dump, Distributor, Mixer, & Truck Mechanic:

HEAVY & HIGHWAY	BASE RATE	\$16.86
	FRINGE BENEFITS	7.34

Euclid & Other Heavy Earthmoving Equipment & Lowboy, Articulator Cat, 5-Axle Vehicle, Winch & A-Frame when used in transporting materials, Ross Carrier, Forklift when used to transport building materials, & Pavement Breaker:

HEAVY & HIGHWAY	BASE RATE	\$16.96
	FRINGE BENEFITS	7.34

End of Document CR-1-26 2005

CHECKLIST FOR SUBMITTING BID

OWNER: OLDHAM COUNTY WATER DISTRICT
PROJECT; 2005 IMPROVEMENTS
CONTRACT Kentucky Highway 146 TANK
BID DATE: _____, 2005 -- 1:30 p.m.

- _____ 1. Completed BID SCHEDULE
- _____ 2. A properly executed and notarized NON-COLLUSION AFFIDAVIT included as part of your bid, page NCA-1.
- _____ 3. A BID BOND, properly signed by the Bidder, and its surety, or cashier's check or certified check in the sum of at least 5% of amount bid included as part of your bid, pages BB-1 and BB-2.
- _____ 4. A list of 5 composite elevated storage tanks constructed in the last 5 years.
- _____ 5. Preliminary drawing of the tank showing dimensions and plate thickness and high and low water level.
- _____ 6. Foundation design drawing showing preliminary dimensions and approximate quantities of concrete and reinforcing steel.

BID FORM

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____*. To the Oldham County Water District (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of Kentucky Highway 146 Tank, in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within three hundred sixty five (365) consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of \$1,000.00 for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

Bids shall include sales tax and all other applicable taxes and fees.

**Insert "a corporation", "a partnership", or "an individual" as applicable.*

BID SCHEDULE
 2005 IMPROVEMENTS
 KENTUCKY HIGHWAY 146 TANK

OLDHAM COUNTY WATER DISTRICT
 BUCKNER, KENTUCKY

Item	Description	Unit Price	Estimated Quantity	Total Price
<u>Kentucky Highway 146 Tank</u>				
Furnish and install, complete, a 2,000,000 Gallon Composite Elevated Water Storage Tank, <u>167</u> feet from base to overflow, in accordance with the plans and specifications.				
1.	Foundation and Tank Design and Shop Drawings	\$	1	\$
2.	Tank Foundation	\$	1	\$
3.	Tank Fabrication	\$	1	\$
4.	Tank Erection	\$	1	\$
5.	Tank Painting	\$	1	\$
6.	Tank Disinfection	\$	1	\$
7.	Site Work, Excluding Access Drive, Site Piping and Fencing	\$	1	\$
8.	Site Fencing and Gate(s)	\$	1	\$
9.	Access Drive	\$	1	\$
10.	Electrical Work	\$	1	\$
11.	Site Piping	\$	1	\$
12.	Sodium Bisulfide Chemical Feed Equipment	\$	1	\$
TOTAL BID (Items 1 thru 12)-----\$				

BID SCHEDULE
2005 IMPROVEMENTS
Kentucky Highway 146 Tank
OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

THE CONTRACT PRICE - The Owner shall pay to the Contractor for the performance of this Contract, subject to any additions or deductions provided herein, the sum as follows:

BID TOTAL: (Summation of Items 1 thru 12): \$ _____

_____ Dollars _____ Cents

Bidder agrees to furnish and install, and perform all work necessary to complete the *Kentucky Highway 146 Tank*, for the Oldham County Water District, Buckner, Kentucky, as required by the specifications and indicated on the Drawings.

All work to be completed in 365 calendar days after written authorization to proceed. Liquidated damages of \$1,000.00 per day shall be paid to the Owner by the Contractor for each calendar day that completion of the construction exceeds the above allowed calendar days, as provided in Section 15 of the General Conditions.

In addition to liquidated damages, the Contractor shall reimburse the Owner for all additional cost incurred by the Engineer for providing Resident Observation for the Project after the allotted time for completion of any milestone of work has expired.

The Bidder, by submitting this bid, is certifying he has reviewed the plans and specifications and that he intends to complete the project with no deviation from the plans and specifications and that he can complete the project in the time frame indicated.

Respectfully submitted:

Signature

Address

Title

Date

SEAL

ATTEST: _____

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BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
_____ as Principal, and
_____ as Surety, are hereby
held and firmly bound unto Oldham County Water District as OWNER in the
penal sum of _____
for the payment of which, well and truly to be made, we hereby jointly and
severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 20 _____.
The Condition of the above obligation is such that whereas the principal has
submitted to Oldham County Water District a certain BID, attached hereto
and hereby made a part hereof to enter into a contract in writing, for the
Kentucky Highway 146 Tank
_____.

NOW THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and
deliver a contract in the Form of Contract attached hereto
(properly completed in accordance with said BID) and shall furnish
a BOND for his faithful performance of said contract, and for the
payment of all persons performing labor or furnishing materials in
connection therewith, and shall in other respects perform the
agreement created by the acceptance of said BID then this
obligation shall be void, otherwise the same shall remain in force
and effect; it being expressly understood and agreed that the
liability of the Surety for any and all claims hereunder shall, in
no event, exceed the penal amount of this obligation as herein
stated.

The Surety, for value received, hereby stipulates and agrees that the
obligations of said Surety and its BOND shall be in no way impaired or
affected by any extension of the time within which the OWNER may accept such
BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)

Surety

By: _____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

**CONTRACTOR'S
NON-COLLUSION AFFIDAVIT**

The Bidder, by its officers and _____
Agents, representatives present at the time of filing this Bid, being duly
sworn, on their oaths say that neither they nor any of them have in any
way, directly or indirectly entered into any agreement or agreements with
any other bidder, or with any public official. Whereby such affiants or
either of them, has paid or is to pay to such bidder or public official,
any sum of money, or has given or is to give to such other bidder or public
official anything of value whatever, or such affiant or affiants or either
of them has not directly or indirectly entered into any agreement or
agreements or arrangements with any other bidder or bidders which tends to
or does lessen or destroy free competition in the letting of the Contract
sought for by the attached bids; that no inducement of any form or
character other than that which appears upon the face of the bids will be
suggested, offered, paid or delivered to any person whomsoever to influence
the acceptance of said bid or awarding of the Contract; nor has this bidder
any agreement or understanding of any kind whatsoever, with any other
person whomsoever to pay, deliver to, or share with any other person in any
way or manner, any of the proceeds of the contract sought by this bid.

(SEAL)

(Bidder)

By _____

(Title)

Subscribed and sworn to before me by _____

this _____ day of _____, 20____. My commission
expires _____.

, Notary Public

(SEAL)

In and for _____ County

State of _____



AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20____, by and between Oldham County Water District, hereinafter called "OWNER" and _____ doing business as (an _____ (Name of Owner), (an individual) individual,) or (a partnership,) or (a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of _____
Kentucky Highway 146 Tank.
2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 10 calendar days after the date of the NOTICE TO PROCEED and will complete the same within 365 calendar days unless the period for completion is extended other- wise by the CONTRACT DOCUMENTS.
4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$_____, or as shown in the BID schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
 - (A) ADVERTISEMENT FOR BIDS
 - (B) INFORMATION FOR BIDDERS
 - (C) BID
 - (D) BID BOND
 - (E) AGREEMENT
 - (F) GENERAL CONDITDIONS

- (G) SUPPLEMENTAL GENERAL CONDITIONS
- (H) PAYMENT BOND
- (I) PERFORMANCE BOND
- (J) NOTICE OF AWARD
- (K) NOTICE TO PROCEED
- (L) CHANGE ORDER
- (M) DRAWINGS prepared by _____
 numbered _____ through _____, and dated _____
 20_____
- (N) SPECIFICATIONS prepared or issued by _____

 dated _____, 20_____
- (O) ADDENDA;
 No. _____, dated _____, 20_____
 No. _____, dated _____, 20_____
 No. _____, dated _____, 20_____
 No. _____, dated _____, 20_____
 No. _____, dated _____, 20_____
 No. _____, dated _____, 20_____
 No. _____, dated _____, 20_____
 No. _____, dated _____, 20_____

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in (_____) each of which shall be deemed an original on the (Number of Copies) date first above written.

OWNER:

Oldham County Water District

BY _____

Name _____ (Please type)

Title _____

(SEAL)

ATTEST:

Name _____ (Please type)

Title _____

CONTRACTOR:

BY _____

Name _____ (Please type)

Title _____

(SEAL)

ATTEST:

Name _____ (Please type)

Title _____

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PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____ hereinafter called Principal,
(Corporation, Partnership or Individual)

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

Oldham County Water District
(Name of Owner)

P.O. Box 51, 3711 W. Highway No. 146, Buckner, Kentucky 40010
(Address of Owner)

hereinafter called OWNER in the penal sum of _____ Dollars,
\$(_____) in lawful money of the United States, for the payment of
which sum well and truly to be made, we bind ourselves, successors, and
assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal
entered into a certain contract with the OWNER, dated the _____ day
of _____ 20____, a copy of which is hereto attached and made a part
hereof for the construction of:

Kentucky Highway 146 Tank

NOW, THEREFORE, if the Principal shall promptly make payment to all
persons, firms, SUBCONTRACTORS, and corporations furnishing materials for
or performing labor in the prosecution of the WORK provided for in such
contract, and any authorized extension or modification thereof, including
all amounts due for materials, lubricants, oil, gasoline, coal and coke,
repairs on machinery, equipment and tools, consumed or used in connection
with the construction of such WORK, and all insurance premiums on said
WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or
otherwise, then this obligation shall be void; otherwise to remain in full
force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby
stipulates and agrees that no change, extension of time, alteration or
addition to the terms of the contract or to the WORK to be performed
thereunder or the SPECIFICATIONS accompanying the same shall in any wise
affect its obligation on this BOND, and it does hereby waive notice of any

such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts,
(number)
parts, each one of which shall be deemed an original, this the _____
day of _____, 20____.

ATTEST:

(Principal) Secretary

(Principal)

BY _____ (s)

(Address)

(Witness as to Principal)

(Address)

BY _____
(Surety)

(Attorney-in-Fact)

(Address)

ATTEST:

(Witness as to Surety)

(Address)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____ hereinafter called Principal,
(Corporation, Partnership or Individual)

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

Oldham County Water District
(Name of Owner)

P.O. Box 51, 3711 W. Highway No. 146, Buckner, Kentucky 40010
(Address of Owner)

hereinafter called OWNER in the penal sum of _____ Dollars,
\$(_____) in lawful money of the United States, for the payment of
which sum well and truly to be made, we bind ourselves, successors, and
assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal
entered into a certain contract with the OWNER, dated the _____ day
of _____ 20____, a copy of which is hereto attached and made a part
hereof for the construction of:

Kentucky Highway 146 Tank

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform
its duties, all the undertakings, covenants, terms, conditions, and
agreements of said contract during the original term thereof, and any
extensions thereof which may be granted by the OWNER, with or without
notice to the Surety and during the one year guaranty period, and if he
shall satisfy all claims and demands incurred under such contract, and
shall fully indemnify and save harmless the OWNER from all costs and
damages which it may suffer by reason of failure to do so, and shall
reimburse and repay the OWNER all outlay and expense which the OWNER may
incur in making good any default, then this obligation shall be void;
otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby
stipulates and agrees that no change, extension of time, alteration or
addition to the terms of the contract or to the WORK to be performed
thereunder or the SPECIFICATIONS accompanying the same shall in any wise
affect its obligation on this BOND, and it does hereby waive notice of any

such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts,
(number)
each one of which shall be deemed an original, this the _____ day of _____, 20____.

ATTEST:

(Principal) Secretary

BY _____
Principal (s)

(SEAL)

(Witness as to Principal)

(Address)

(Address)

(Surety)

ATTEST:

(Surety) Secretary

(SEAL)

(Witness as to Surety)

(Address)

BY _____
(Attorney-in-Fact)

(Address)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

NOTICE OF AWARD

To: _____

PROJECT Description: Kentucky Highway 146 Tank

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____, 20____ and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20____.

Oldham County Water District

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

by _____

this the _____ day of _____, 20____

By _____

Title _____

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NOTICE TO PROCEED

To: _____

Date: _____
Project: Kentucky Highway 146 Tank

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 20____, on or before _____, 20____, and you are to complete the work within _____ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 20____.

Oldham County Water District
(Owner)

By _____
Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged

by _____
this the _____ day of _____, 20____
By _____
Title _____

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CHANGE ORDER

ORDER NO. _____

DATE: _____

AGREEMENT DATE: _____

NAME OF PROJECT: Kentucky Highway 146 Tank

OWNER: Oldham County Water District

CONTRACTOR: _____

Justification:

Change to CONTRACT PRICE:

Original CONTRACT PRICE \$ _____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER \$ _____

The CONTRACT PRICE due this CHANGE ORDER will be (increased) (decreased) by \$ _____.

The new CONTRACT PRICE including this CHANGE ORDER will be \$ _____.

Change to CONTRACT TIME:

The CONTRACT TIME will be (increased) (decreased) by _____ calendar days.

The date for completion of all work will be _____ (Date).

Approvals Required:

To be effective this Order must be approved by the Federal agency if it changes the scope or objective of the PROJECT, or as may otherwise be required by the SUPPLEMENTAL GENERAL CONDITIONS.

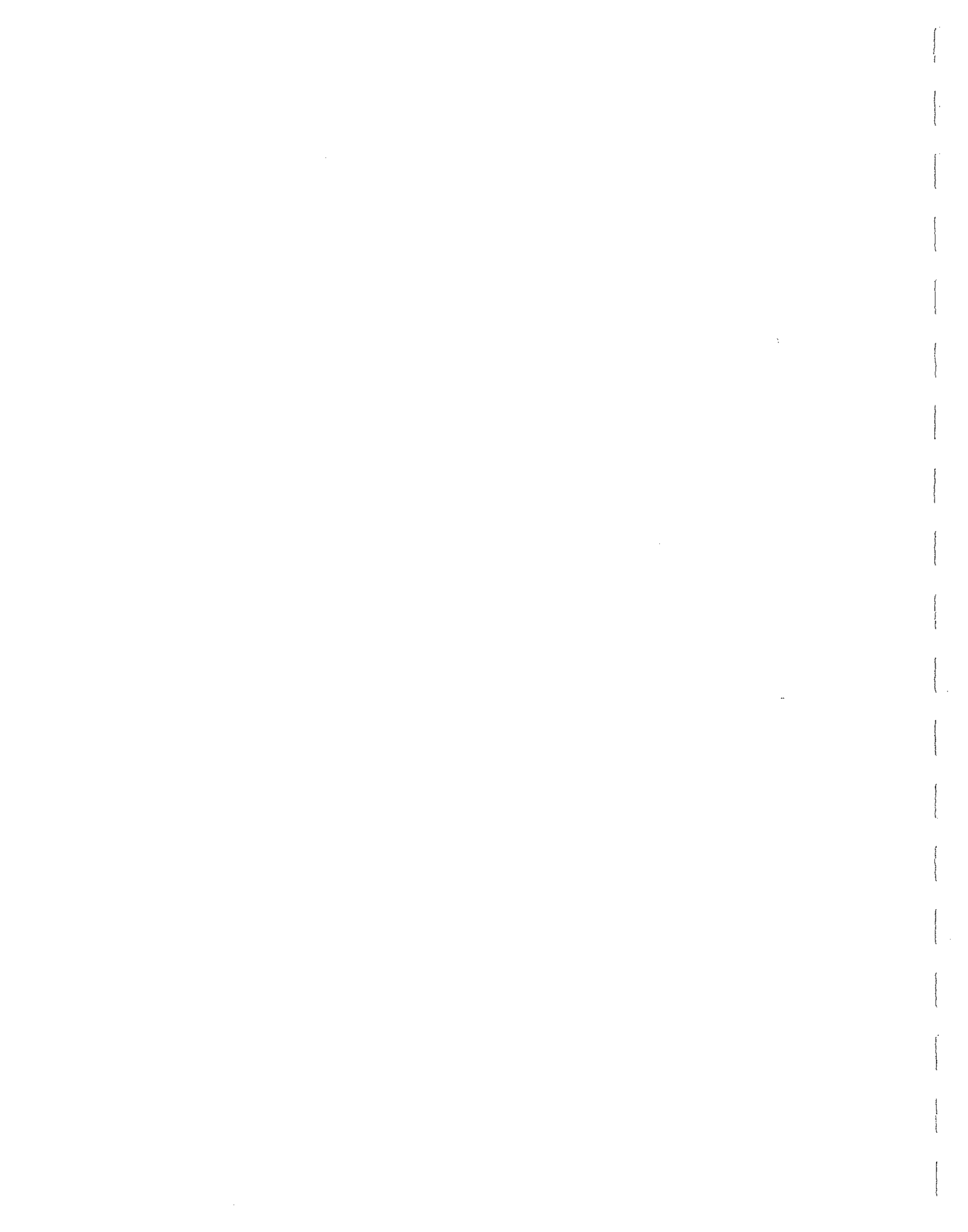
Requested by: _____

Recommended by: _____

Ordered by: _____

Accepted by: _____

Federal Agency Approval (where applicable) _____



PAYMENT FORM

JOB NO.: _____

PAGE _____ OF _____

PERIODIC ESTIMATE FOR PARTIAL PAYMENT

PURCHASE ORDER NO.:			DATE OF CONTRACT:				DATE OF COMPLETION:				
Name and Location of Project: <p align="center">Kentucky Highway 146 Tank</p>											
Name and Address of Contractor:						Owner: Oldham County Water District 3711 W. Highway No. 146 P.O. Box 51 Buckner, Kentucky 40010					
PERIODIC ESTIMATE NO: _____ FOR PERIOD _____, 20____ TO _____, 20____											
ITEM NO.	DESCRIPTION	CONTRACT				PREVIOUS ESTIMATE		THIS ESTIMATE		TOTAL	
		Quant.	Unit	Price	Amt.	Quant.	Amt.	Quant.	Amt.	Quant.	Amt.
TOTAL AMOUNT OF COLUMNS											

ESTIMATE NUMBER _____

PAGE _____ OF _____

TOTAL CONTRACT INCLUDING CHANGE ORDERS:

\$ _____

ANALYSIS OF WORK PERFORMED:

- (a) Completed work to date \$ _____
- (b) Add material on Job Site
(Attach Schedule) \$ _____
- (c) Total of a and b \$ _____
- (d) Less ____% retained per Contract \$ _____
- (e) Net Amount earned to date \$ _____
- (f) Less previous invoices \$ _____

Total Due this estimate: \$ _____

Total Invoiced to Date \$ _____

Balance of Contract To Be Completed \$ _____

CERTIFICATION OF CONTRACTOR: To the best of my knowledge, these quantities are true and correct and have been installed or are on the job site in accordance with the contract documents.

(Contractor)

By: _____
(Signature of Authorized Representative)

Date: _____

Title: _____

CERTIFICATION OF ARCHITECT OR ENGINEER: I have reviewed this estimate and to the best of my knowledge, it is true and correct.

(Architect or Engineer)

(Resident Observer)

Date: _____

Date: _____

REMARKS:

GENERAL CONDITIONS

1. Definitions
2. Additional Instructions and Detail Drawings
3. Schedules, Reports and Records
4. Drawings and Specifications
5. Shop Drawings
6. Materials, Services and Facilities
7. Inspection and Testing
8. Substitutions
9. Patents
10. Surveys, Permits, Regulations
11. Protection of Work, Property, Persons
12. Supervision by Contractor
13. Changes in the Work
14. Changes in Contract Price
15. Time for Completion and Liquidated Damages
16. Correction of Work

17. Subsurface Conditions
18. Suspension of Work, Termination and Delay
19. Payments to Contractor
17. Subsurface Conditions
18. Suspension of Work, Termination and Delay
19. Payments to Contractor
20. Acceptance of Final Payment as Release
21. Insurance
22. Contract Security
23. Assignments
24. Indemnification
25. Separate Contracts
26. Subcontracting
27. Engineer's Authority
28. Land and Rights-of-Way
29. Guaranty
30. Arbitration
31. Taxes

1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural hereof:

1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement For Bids, Information For Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR - The person, firm or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER - The person, firm or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR - An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but how does not perform labor at the site.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2 The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scale dimensions, and detailed DRAWINGS shall govern over general DRAWINGS.

4.3 Any discrepancy found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6. MATERIALS, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services

and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR WILL GIVE THE engineer TIMELY NOTICE OF READINESS. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests or approvals by the engineer or others shall not relieve the CONTRACTOR from his obligations to perform the OWNER in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or state agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection, or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation,

inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

8. SUBSTITUTIONS

8.1 Whenever a material, article or piece of equipment is identified on the DRAWINGS and SPECIFICATIONS by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalogue number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its submission and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

9. PATENTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting

expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

10.3 Permit and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACTOR DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain

on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such change pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

14. CHANGES IN CONTRACT PRICE

14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

(a) Unit prices previously approved.

(b) An agreed lump sum.

(c) The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the work. In addition there shall be added an amount to be agreed upon but not to exceed fifteen (15) percent of the actual cost of the WORK to cover the cost of general overhead and profit.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order issued by the OWNER.

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, and equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if he determines the

facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged a bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK, or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request

nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the Contract or any portion thereof, nor of his right, title or interest therein, or his obligations thereunder, without written consent of the other party.

24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.

25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself, or he may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties in such Contracts (or the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefor as provided in Sections 14 and 15.

26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

29. GUARANTY

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of three (3) years from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

30. ARBITRATION

30.1 All claims, disputes, and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by the making and acceptance of final payment as provided by Section 20, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association. This agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the demand for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and with the American Arbitration Association, and a copy shall be filed with the ENGINEER. Demand for arbitration shall in no event be made on any claim, dispute or other matter in question which would be barred by the applicable statute of limitations.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

31. TAXES

31.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

32. PLANS AND SPECIFICATIONS

32.1 The OWNER will provide six (6) sets of Construction Specifications and Plans to the awarded CONTRACTOR free of charge.

32.2 The awarded CONTRACTOR will not receive a refund for any plans he purchased.



SUPPLEMENTARY GENERAL CONDITIONS

1. APPLICATION

These Supplementary General Conditions and Special Conditions are intended to simplify or amend the General Conditions as specifically stated herein.

2. INSURANCE - SECTION 21

The Contractor shall include in his bid price or prices the cost of all insurance set forth in Section 21 of the "General Conditions". The limits of liability for the insurance required by Section 21 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations. The types of insurance and the limits of liability indicated are the minimum required. Neither the OWNER or ENGINEER warrant the adequacy of the types of insurance or the limits of liability required. Any policy exclusions shall be indicated on the insurance certificate. Insurance shall be provided on an occurrence form basis. CONTRACTOR shall provide verification of all coverage's with or on the insurance certificate. The amounts of such insurance shall be as follows:

2.1 Workers' Compensation, and related coverages under Paragraphs 21 of the General Conditions:

- a. State: Statutory
- b. Applicable Federal (e.g., Longshoreman's): Statutory
- c. Employer's Liability:

Bodily Injury by Accident:

Each Accident	\$	100,000
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Bodily Injury by Disease:

Each Employee	\$	100,000
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Policy Limit	\$	500,000
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2.2. CONTRACTOR'S General Liability under Section 21 of the General Conditions which shall be written on a commercial general liability form and which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of CONTRACTOR:

a. Policy Limits:

1) General Aggregate Limit (other than P-CO)	\$	1,000,000
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2) Products - Completed Operations Aggregate Limit	\$	1,000,000
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- 3) Personal and Advertising Injury Limit \$ 1,000,000
 (Per Person/Organization)
- 4) Each Occurrence Limit \$ 1,000,000
 (Bodily Injury and Property Damage)
- 5) Fire Legal Liability Damage Limit
 (Any One Fire) \$ 50,000
- 6) Medical Expense Limit
 (Any One Person) \$ 5,000

b. Policy shall include as a minimum the following coverages:

- 1) Broad Form Property Damage Coverage.
- 2) An elimination of the exclusions with respect to property under the care, custody, or control of CONTRACTOR. In lieu of elimination of the exclusion, CONTRACTOR may provide Builder's Risk or Installation Floater coverage for property under the care, custody, or control of CONTRACTOR.
- 3) Explosion, Collapse, and Underground coverages where applicable under Property Damage Liability Insurance.
- 4) Contractual Liability Coverage.
- 5) Independent Contractor Coverage.
- 6) General Aggregate Limits specified above shall apply separately to this project by attachment of:

"Amendment of Limits of Insurance - Designated Projects" Endorsement (ISO Form No. CG 25011185) or "Amendment - Aggregate Limits of Insurance - Per Project" Endorsement (ISO Form CG 25031185) or equivalent endorsement coverage.

2.3. Commercial Automobile Liability under Section 21 of the General Conditions:

- a. Combined Single Limit
 (Bodily Injury and Property Damage): \$ 1,000,000
- b. Policy shall include contractual liability coverage and coverage on all owned, non-owned and hired vehicles.

2.4. Umbrella Coverage:

- a. Umbrella policy (pay on behalf form) with limits of \$5,000,000 for bodily injury, personal injury and property damage on a combined basis shall be provided with the stated underlying limits of Paragraphs 2.1, 2.2 and 2.3 of the Supplemental General Conditions.

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- b. Policy shall include OWNER, ENGINEER, and any others required by Section 21 of the General Conditions as additional insureds.
- c. The stated limits of Paragraphs 2.1, 2.2 and 2.3 of the Supplementary General Conditions can be obtained through individual policies or in conjunction with an umbrella policy (pay on behalf form) to arrive at the total limits requested.

Contractor shall require sub-contractors, if any, not protected under Contractor's insurance policies, to take out and maintain insurance of the above amounts. It is the intent of this section that the Contractor completely protect the OWNER and ENGINEER from damage suits resulting from Contractor's negligence.

Regardless whether or not an OCP policy or Project Management Protective Liability policy is furnished, insurance certificates for commercial general, automobile, umbrella, and builders risk shall specifically indicate by name the additional insureds which are to include OWNER and ENGINEER. Certificates shall be Acord 25-S or equivalent.

Additional insured Endorsement/OCP Policy/Project Management Protective Liability Policy.

- 1. CONTRACTOR shall purchase and maintain liability insurance, as described above, specifically naming as additional insureds OWNER and ENGINEER as well as other individuals or entities so identified (see the Supplementary Conditions), and specifically stating the following language as the Additional Insurance Endorsement on Form CG 20 26 07 04 or equivalent form:

"That the persons insured under this policy is amended to include as an additional insured, OWNER and ENGINEER as well as other individuals and entities so identified, but only with respect to liability arising out of (1) operations performed for the additional insured by the named insured or (2) acts or failure to act by the additional insured in connection with general supervision, inspection and/or coordination of CONTRACTOR'S operations."

- 2. As an alternative to providing Form CG 20 26 07 04, CONTRACTOR may furnish to OWNER an OWNER'S and Contractors Protective (OCP) policy or a Project Management Protective Liability policy, with ENGINEER as additional insured. OCP policy or Project Management Protective Liability policy shall provide for bodily injury and property damage coverage equal to the sum of: the general aggregate limit for commercial general liability plus the amount specified for the umbrella coverage. OCP policy or Project Management Protective Liability policy shall provide coverage arising out of:

- i. operations performed by CONTRACTOR at the project location.
- ii. acts or omissions in connection with the general supervision of such operations.

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Endorsements, OCP, and/or Project Management Protective Liability policy shall not exclude supervisory or inspection services.

3. PATENTS

General Conditions, Section 9 (b), amend to read: "Any license or royalty fees required by work under these contracts shall be the responsibility of the Contractor".

4. ADDITIONAL INSTRUCTIONS AND DETAILS DRAWINGS - (Ref. Sec. 2, General Conditions) .

The successful Contractor shall be furnished six (6) sets of plans and specifications for his use. Additional plans and specifications may be purchased from Strand Associates, Inc., 629 Washington Street, Columbus, Indiana 47201.

5. RETAINAGE - (Ref., General Conditions, paragraph 19.1)

Provision for reduction in retainage to 5% has been deleted.

6. INDEMNIFICATION - SECTION 24

Add the following to the end of Paragraph 24.1 of the General Conditions:

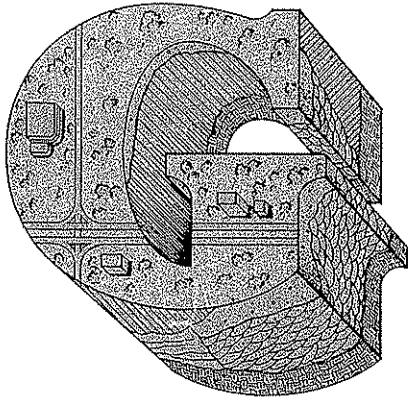
CONTRACTOR shall, at his own expense, appear, defend, and pay all fees of attorneys and all costs and other expenses arising therefrom or incurred in connection therewith; and, if any judgments shall be rendered against any individual or entity indemnified hereunder in any such action, CONTRACTOR shall, at his own expense, satisfy and discharge same. CONTRACTOR expressly understands and agrees that any Letter of Credit or insurance protection required by the Contract, or otherwise provided by CONTRACTOR, shall in no way limit the responsibility to indemnify, keep and, save harmless and defend any individual or entity indemnified hereunder as herein provided.

Delete Paragraph 24.3. Insert new Paragraphs 24.3 and 24.4.

24.3 The obligation of the CONTRACTOR under this Section shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation of Drawings, Specifications or Property Surveys.

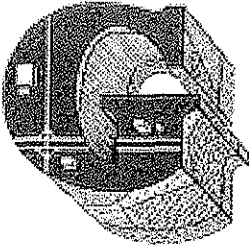
24.4 For any matter for which ENGINEER is indemnified under Paragraph 24.1, CONTRACTOR shall pay for ENGINEER's reasonable defense, including, but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs or awards until ENGINEER is found negligent. If ENGINEER is found negligent, ENGINEER shall reimburse CONTRACTOR for the prorata extent of ENGINEER's negligence for the cost of ENGINEER's reasonable defense.

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GREENBAUM ASSOCIATES, INC.
GEOTECHNICAL & CIVIL ENGINEERS

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GREENBAUM ASSOCIATES, INC.
GEOTECHNICAL & CIVIL ENGINEERS

994 Longfield Avenue
Louisville, Ky 40215
502/361-8447
FAX 502/361-4793

June 23, 2005

Mr. Phillip Ward
Oldham County Water District
P.O. Box 51
Buckner, KY 40010

**Re: Geotechnical Investigation
2 Million Gallon Overhead Storage Tank
Dynergy Power Plant Site, Buckner, Kentucky
P.N. 04-149**

Dear Mr. Ward:

A report of the geotechnical investigation that we carried out for the proposed two million gallon overhead storage tank is attached.

The soils found on this site are medium stiff to very stiff in consistency and provide a bearing capacity of approximately 3,000 pounds per square foot. Due to the anticipated loads, this capacity does not allow for an economic design. Because of loads and the very irregular rock surface (some very shallow) foundations should bear on rock. The foundations bearing on bedrock can be designed on an allowable net bearing capacity of 10,000 pounds per square foot.

Meanwhile, we will be available to consult with you or your structural engineer to expand on these findings and recommendations. If you have any questions please call us at your convenience.

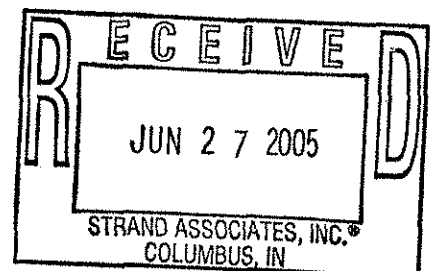
Yours very truly,

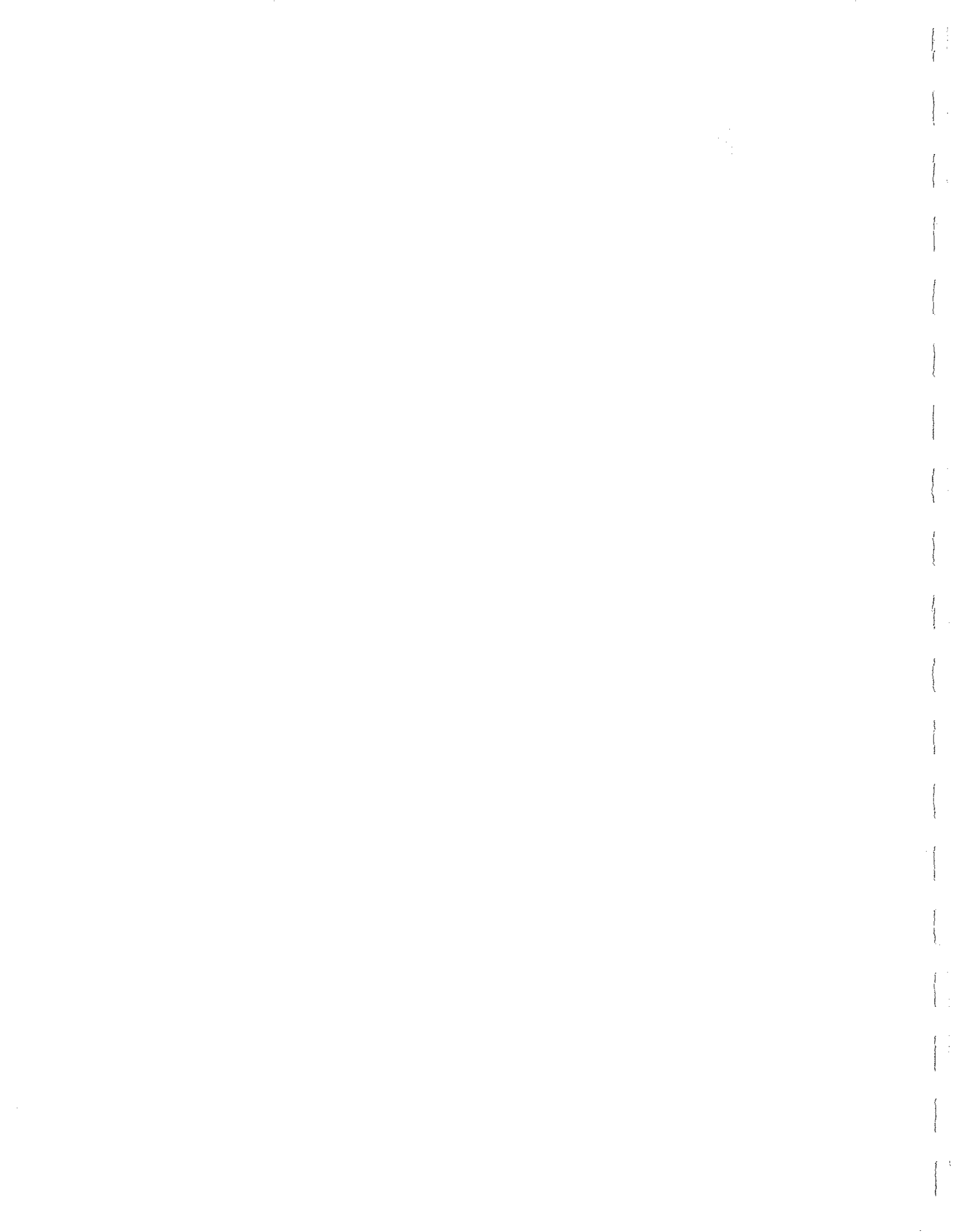
GREENBAUM ASSOCIATES, INC.

Timothy M. Hitchcock, EIT
Staff Geotechnical Engineer

Milton M. Greenbaum, P.E.
Principal Engineer

cc James McNulty
Strand Associates, Inc.
629 Washington Street
Columbus, IN 47202





GEOTECHNICAL INVESTIGATION

**FOR
2 MILLION GALLON OVERHEAD STORAGE TANK
DYNERGY POWER PLANT SITE
BUCKNER, KENTUCKY**

**FOR
OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY**

**BY:
GREENBAUM ASSOCIATES, INC.
994 LONGFIELD AVENUE
LOUISVILLE, KENTUCKY 40215**

JUNE 23, 2005



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1.0 Introduction

The Oldham County Water District intends to construct a new two million gallon overhead storage tank. This elevated water storage tank is to be located on a site adjacent to the Dynergy Power Plant in Buckner, Kentucky.

We were asked by Mr. Phillip Ward with the Oldham County Water District to carry out a geotechnical investigation directed at determining foundation support characteristics of the materials upon which this elevated water storage tank will be supported.

2.0 General Geology

The soil present on this site is residuum, that is soil which is formed through weathering of the local bedrock. Bedrock is shown by the Kentucky Geological Survey to be part of the Laurel Dolomite. This formation is described as follows:

Dolomite, light-gray to olive-gray, weathers yellowish-gray to grayish-orange, calcitic; faintly layered into 1- to 4-inch thick, distorted and disrupted beds of fine- and coarse-grained rock; contains abundant tiny pores, small clots of large colorless calcite crystals, and small scattered crystals of calcite. Dolomite seems to have replaced fossil hash in which crinoid columnals are identifiable. Whole unit except lower few feet tends to weather as single bed; entire unit weathers with extremely rough surface with ragged lenticular holes several inches across. Springs occur at base of unit in many areas.

3.0 Investigation

Four borings were carried out within the footprint of the proposed water storage tank, three around the perimeter and one at the tank's center. Soil borings were drilled by standard penetration procedures to refusal on bedrock. All of the borings were drilled using a CME-550 all-terrain-vehicle mounted drill rig through the use of 3-¼ inch inside diameter hollow stem augers. One of the borings (boring B-3) was continued ten feet into bedrock by rotary coring procedures.

The standard penetration procedure involves driving a standard 2-inch diameter split spoon in the formation at selected intervals using a 140-pound hammer falling through 30 inches. The blow counts for each 6 inches of drive to a total of 18 inches is recorded and the number of blows for the 12 inches after the first 6 inches is a standard measure of the condition of the soil. As the split spoon is removed from the ground, it retrieves a sample of the soil in a disturbed condition. Nevertheless, this sample is suitable for certain classification tests and is representative of the soils at the depth tested.

An NX double tube core barrel with a diamond drill bit was used to core the rock. The double tube core barrel itself minimizes the erosive action of the drilling fluid on the core and thereby improves core recovery. A swivel type double tube core barrel was used. The core barrel consists of a core barrel head, an outer barrel, an inner core recovery tube, a reaming shell, a core lifter and a coring bit. In operation, the inner tube remains stationary while the outer barrel is rotated. This minimizes the possibility of core disturbance through torsional forces and thereby improves recovery. Water passages direct the flow of the drilling fluid into the annular space between the two tubes and vents provide for the exit of the water from the barrel. The inner tube assembly is suspended from the outer tube head in such a manner that downward force can be applied to both tubes while only the outer tube is rotated.

Soil samples were returned to the laboratory where a program of testing was carried out. This testing included one (1) grain size analysis, one (1) Atterberg Limits test and natural moisture determinations on all of the soil samples.

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Grain size determination arrives at a curve of grain size against that fraction of the soil that is finer than that particular grain size. It also allows the determination of the clay fraction, silt fraction, sand fraction, etc. in any particular soil sample. Based on this division of grain sizes, the field soils classifications are refined and the boring logs adjusted. In the case of fine grained soils, the soils are largely silt and clay; thus, requiring that the soils be suspended in an aqueous medium and the rate at which the particles drop out is measured in order to arrive at the grain size distribution. Silt and clay grains are so fine that sieve analysis alone will not function in this range. The coarse fraction of this sample is separated from the fine and run through a nest of sieves in order to further detail the grain size distribution in the coarse range.

The Atterberg Limits determination arrives at those moisture contents at which the soil turns from a solid state to a plastic condition (the Plastic Limit) and then from a plastic condition to a liquid condition (The Liquid Limit). The points in question are arrived at by standard procedures that accept specific cohesive and flow properties of the soil as standard for these limits. Again, knowing the moisture content of the soil in relation to these limits provides some broad measure of the soil strength and soil characteristics. The arithmetic difference between these two limits is called Plasticity Index and all three together are used for classifying the soils in a number of standard systems.

A number of natural moisture determinations were run. This test arrives at the in-situ moisture content of the soil and is useful for correlating the strength of various samples of like texture and in conjunction with the Atterberg limits, give a strong measure of the strength range the soils are likely to be found in.

4.0 Findings

4.1 Boring and Laboratory Results

This site is covered by 7 to 8 inches of topsoil. Below this is moist, medium-stiff to very stiff, yellowish brown and yellow and red mottled, clay of high plasticity to bedrock. In boring B-4, moist yellowish brown silty clay of moderate plasticity was encountered at a depth of 2 feet to 5 feet. Bedrock was encountered at 4 to 8 feet depth. Bedrock is dolomite interbedded with shale and clay seams of moderate quality. Rock coring was performed in two 5 foot runs. The first 5 foot run had a 98 percent core recovery and a Rock Quality Designation of 43 percent. The second had a 93 percent recovery and a Rock Quality Designation of 56 percent.

N-values, as measured by the standard penetration test, are in the range of 11 to 14 with values as high as 22 and as low as 7 through the extent of the borings.

One sample from boring B-3 at a depth of 5 to 6.5 feet was tested and classified. This sample was found to consist of 8 percent sand, 18 percent silt and 74 percent clay. An Atterberg limits test indicated a liquid limit of 84 percent, a plastic limit of 37 percent and a plasticity index of 47 percent. This soil is classified as CH by the Unified system and as A-7-6 by the AASHTO system.

5.0 Recommendations

5.1 Foundations

This site is covered primarily with soils with medium stiff to very stiff consistencies but are highly plastic and, therefore, subject to shrinkage and swelling with moisture changes. These soils provide an allowable net bearing capacity of 3,000 pounds per square foot. This bearing capacity is insufficient for an economical design for the anticipated loads. Furthermore, rock was found at depths above the normal bearing in some of the borings. Therefore, the storage tank should bear upon bedrock.

Foundations must bear upon competent unweathered rock. It is likely that the upper portion of bedrock, approximately one foot, will need to be excavated. To limit differential settlement, foundations will need to bear entirely on rock, not partially on rock and partially on soil. Bedrock encountered during our excavation can provide an allowable net bearing capacity of 10,000 pounds per square foot. If soil is encountered at the bearing surface elevation, it should be removed to bedrock. This excavation should then be refilled with concrete to the bearing elevation.

Footing concrete should be cast from earth wall to wall without forms to seal the footings to the soil. Bearing surfaces should be keyed at least one foot into the rock and excavated to a level bearing surface.

Spread footings must bear at least 30 inches below exterior final grade to insulate the bearing strata from freezing. Continuous footings must be at least 18 inches wide and isolated footings must be at least 24 inches wide.

Settlement of spread footings bearing on bedrock should be less than one-half inch with differential settlement not exceeding one-quarter of an inch.

5.2 Seismic Site Classification

By the 2002 edition of the Kentucky Building Code table 1615.1.1, with foundations resting on bedrock, this is a rock profile, site class B. The Site Coefficients F_a and F_v , which are short period response and one-second response, are both 1.0.

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5.3 Site Preparation and Earthwork

Organic-free, chemical-free, on-site soils are suitable for use as engineered fill. All fill should be placed in lifts not exceeding eight (8") inches in uncompacted thickness and must be compacted to at least 95% of the soil's maximum dry density (ASTM D-698, Standard Proctor). Soil moisture content should be within two (2%) percent of optimum as determined from the standard Proctor.

Soil from any off-site borrow sources should be tested and approved by this office prior to being used on the site. Satisfactory borrow materials are those falling in one of the following classifications: ML, CH, or CL only to seal out surface moisture. MH and OH soils and peat are unsatisfactory borrow materials. Granular material should not be used as fill to minimize the opportunity for moisture loss or gain in these plastic soils.

The site should be maintained in a well-drained condition both during and after construction. Site grading should direct drainage of surface run-off away from the foundation of the proposed elevated water tank.

The placement of compacted fill should be carried out by an experienced excavator with the proper materials. The excavator must be prepared to adapt his procedures, equipment and materials to the type of project, to weather conditions, and the structural requirements of the engineer. Methods and materials used in summer may not be applicable in winter; soil used in proposed fill may require wetting or drying for proper placement and compaction. Conditions may also vary during the course of a project or in different areas of this site. These needs should be addressed in the project drawings and specifications.

During freezing conditions, the fill must **not** be frozen when delivered to the site. It also must not be allowed to freeze during or after compaction. Since the ability to work the soil while keeping it from freezing depends in part on the soil type, the specifications should require the contractor to submit a sample of his proposed fill before construction starts, for laboratory testing. If the soil engineer determines that it is not suitable, it should be rejected. In general, silty sand, clayey sand, and cohesive/semi-cohesive soils should not be used as fill under freezing conditions. All frozen soil of any type should be rejected for use as compacted fill.

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It is important that compacted fill be protected from freezing after it is placed. The excavator should be required to submit a plan for protecting the soil. The plan should include details on the type and amount of material (straw, blankets, extra loose fill, topsoil, etc.) proposed for use as frost protection. The need to protect the soil from freezing is ongoing throughout construction and applies both before **and** after concrete is placed, until backfilling for final frost protection is completed. Foundations placed on frozen soil can experience heaving and significant settlement, rotation, or other movement as the soil thaws. Such movement can also occur if the soil is allowed to freeze **after** the concrete is placed and then allowed to thaw. The higher the percentage of fines (clay and silt, P-200 material) in the fill, the more critical is the need for protection from freezing.

The contractor should be required to adjust the moisture content of the soil to within a narrow range near the optimum moisture content (as defined by the applicable Proctor or AASHTO Test). In general, fill should be placed within 2% of optimum moisture. The need for moisture control is more critical as the percentage of fines increases. Naturally occurring cohesive/semi-cohesive soil are often much wetter than the optimum. Placing and attempting to compact such soils to the specified density may be difficult. Even if compacted to the specified density, excessively wet soils may not be suitable as pavement subgrades due to pumping under applied load. This is especially true when wet cohesive/semi-cohesive soil is used as backfill in utility trenches and like situations. Excessively wet soil in thick fill sections may cause post-construction settlement beyond that estimated for fill placed at or near ($\pm 2\%$) the optimum moisture content.

5.4 Earth Pressures and Retaining Walls

Any retaining walls should be constructed with a drainage blanket of sand or a synthetic drainage material. Synthetic drainage media should be available from suppliers of geotextile. The wall should be drained at its base by a perforated PVC underdrain or weepholes at a spacing of not more than ten feet. Where a relatively thin drainage blanket is used, the retaining wall should be designed based on a coefficient of active earth pressure (K_a) of 0.36 and a soil unit weight (γ_w) of 115 pounds per cubic foot. This results in an equivalent fluid pressure of 50 pounds per cubic foot. Where granular backfill completely fills the area defined by a plane extending upward from the base of the wall at a 45 degree angle, the retaining wall may be designed based on a coefficient of active earth pressure (K_a) of 0.27 and a soil unit weight (γ_w) of 120 pounds per cubic foot. This results in an equivalent fluid pressure of 33 pounds per cubic foot.

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However, where the wall is restrained from movement, as in the case of building basement walls bearing against the basement slab or building frame the wall must be designed based on the "at rest" earth pressure. The coefficient of "at rest" earth pressure (K_0) is 0.47 with a soil unit weight (γ_w) of 115 pounds per cubic foot in the case of a thin drainage blanket behind the wall, resulting in an equivalent fluid of 60 pounds per cubic foot unit weight. Where granular backfill completely fills the area defined by a plane extending upward from the base of the wall at a 45 degree angle, the retaining wall may be designed based on a coefficient of "at rest" earth pressure (K_0) of 0.43 and a soil unit weight (γ_w) of 120 pounds per cubic foot. This results in an equivalent fluid pressure of 51 pounds per cubic foot.

Surcharge above the wall will add additional load. A uniform surcharge must be multiplied by the appropriate coefficient of earth pressure to determine the additional load applied to the wall. The internal angle of friction (Φ) of the soil underlying foundations is estimated to be 28° resulting in a coefficient of friction of 0.53.

Any retaining wall design must use appropriate factors of safety. It is critical that drainage be provided as mentioned earlier in this section in order to avoid hydrostatic pressure. Hydrostatic pressure would increase pressure against the wall substantially.

5.5 Limitations

We strongly recommend that bearing surfaces and compaction be monitored by Greenbaum Associates, Inc. Our technicians will be available to further assist you in providing these and other normally specified quality control services. The report is preliminary until such time as these examinations are completed to confirm conditions consistent with those discovered.

The conclusions and recommendations offered in this report are based on the subsurface conditions encountered in the borings. No warranties can be made regarding the continuity of conditions between or beyond borings. If, during construction, soil conditions are encountered that differ from those indicated in this report, a representative of Greenbaum Associates, Inc. should inspect the site to determine if design modification is required.

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This study was directed at a specific overhead storage tank to be constructed within a reasonably short period after this study. Use for any other location, structures or substantial changes in construction period may invalidate the recommendations. The geotechnical engineer should be consulted relative to any substantial change in these.

This study is directed at mechanical properties of the soils and includes no sampling, testing or evaluation for environmental considerations.

Important Information About Your Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. *Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. And no one — not even you — should apply the report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. *Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:*

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, always inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. Always contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.*

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where *subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.*

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual*

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

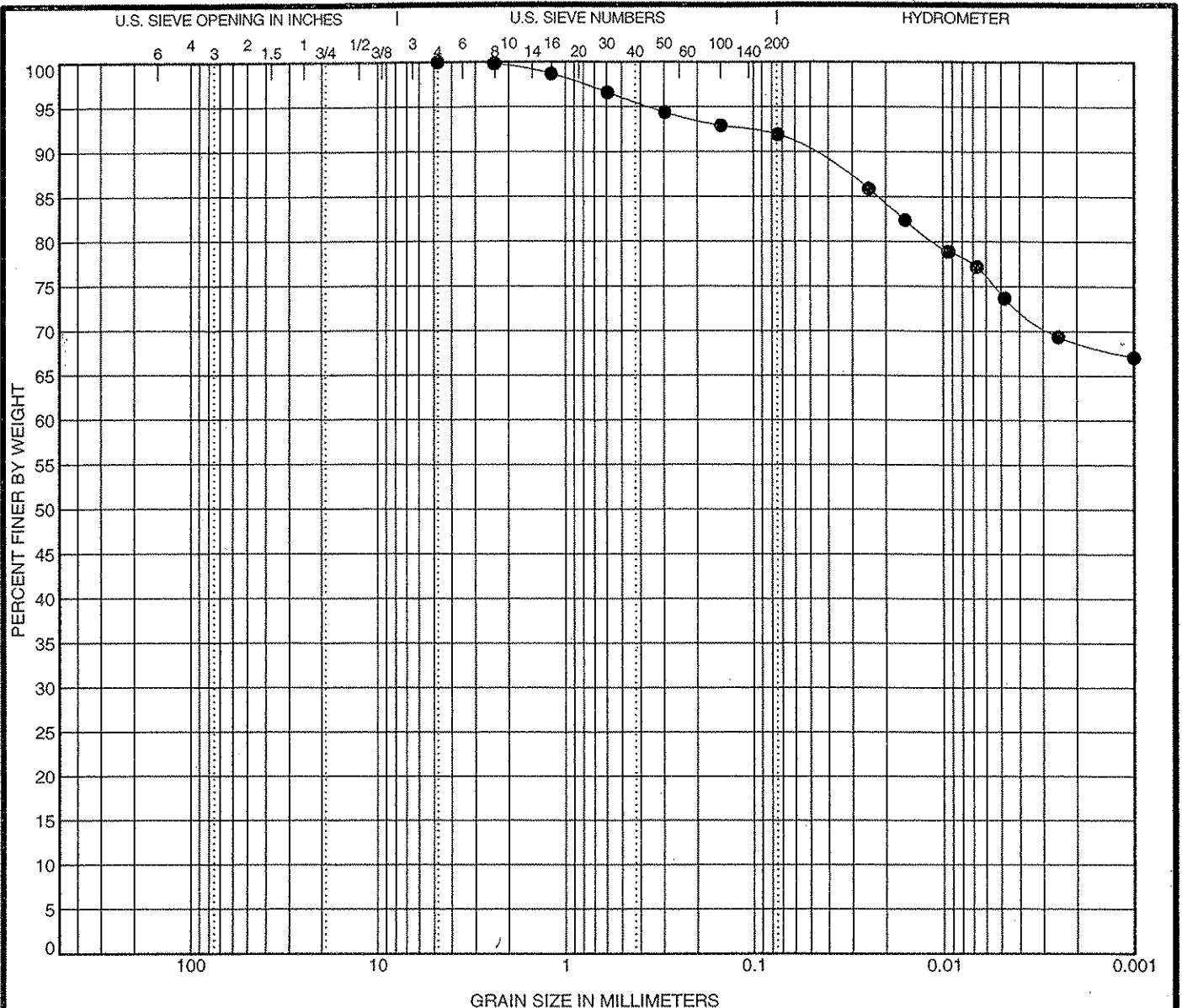
Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.



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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● B-3 5.0	FAT CLAY(CH)	84	37	47		

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3 5.0	4.76				0.0	8.0	17.8	74.1

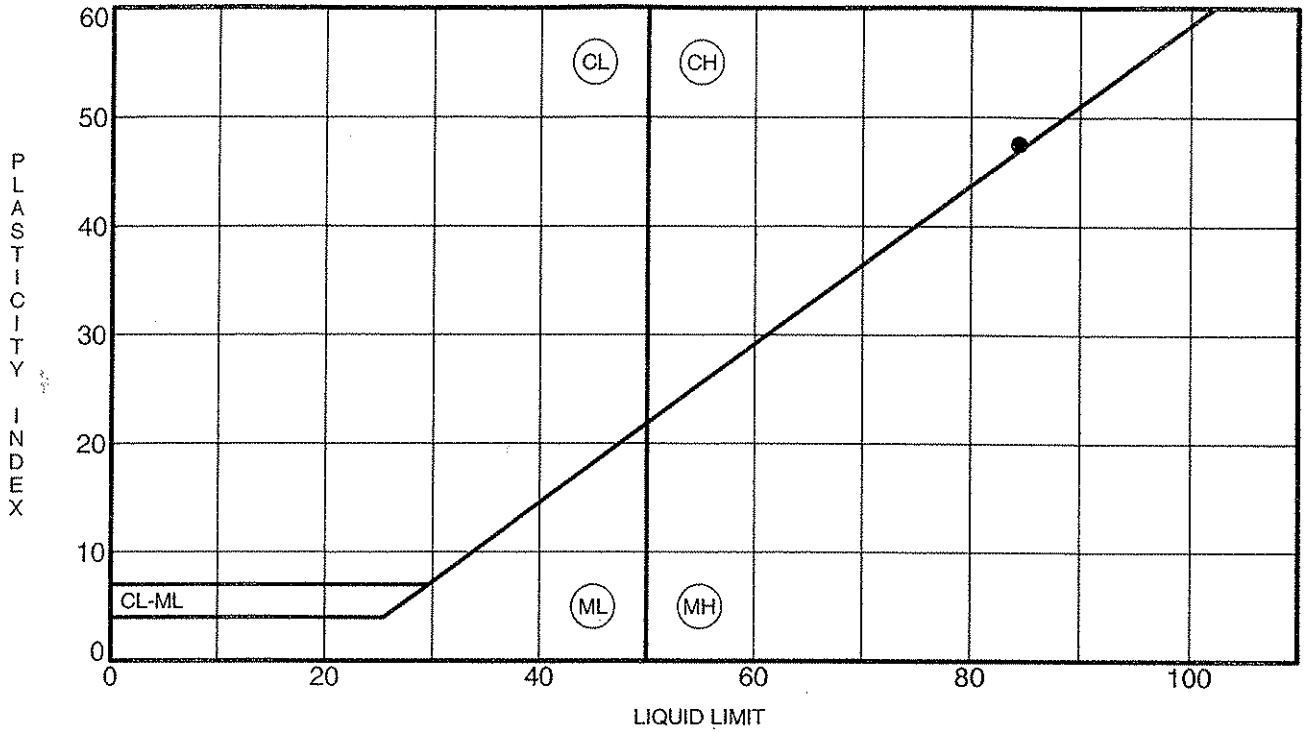
US GRAIN SIZE 04-149.GPJ GREENBAUM.GDT 8/15/05



Greenbaum Associates, Inc.

GRAIN SIZE DISTRIBUTION

Project: Oldham County Dynergy Power Plant
 Location: Oldham Co., KY
 Number: 04-149



Specimen Identification	LL	PL	PI	Fines	Classification	
● B-3	5.0	84	37	47	92	FAT CLAY(CH)

US ATTERBERG LIMITS 04-149.GPJ GREENBAUM.GDT 8/15/08



Greenbaum Associates, Inc.

ATTERBERG LIMITS' RESULTS

Project: Oldham County Dynergy Power Plant
 Location: Oldham Co., KY
 Number: 04-149

SOIL DESCRIPTION TERMINOLOGY

Soils are identified and classified in this report according to the Unified Soil Classification System with the following modifiers:

RELATIVE DENSITY OF GRANULAR SOILS

Description	Blows/Foot
Very loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	50 to 80
Extremely Dense	80 +

CONSISTENCY OF COHESIVE SOILS

Description	N	q _c (tsf)
Very soft	2	0 to 0.25
Soft	2-4	0.25 to 0.50
Medium	4-8	0.50 to 1.0
Stiff	8-15	1.0 to 2.0
Very Stiff	15-30	2.0 to 4.0
Hard	> 30	4.0 to 8.0
Very Hard		8.0 +

PARTICLE SIZES

Components	Size or Sieve No.
Boulders	over 12 inches
Cobbles	3 to 12 inches
Gravel	Coarse 3/4 to 3 inches
	Fine No. 4 to 3/4 inches
Sand	Coarse No. 10 to No. 4
	Medium No. 40 to No. 10
	Fine No. 200 to No. 40
Fines (silt and clay)	Below No. 200

SOIL MOISTURE

Descriptive Term	
Dry	- Dry of Standard Proctor Optimum
Damp	- Moist, sand only
Moist	- Near Standard Proctor Optimum
Wet	- Wet of Standard Proctor Optimum
Saturated	- Free water in sample

ROCK QUALITY DETERMINATION

The Rock Quality Determination (Deere et. al., 1969) method of determining rock quality as reported here was obtained by summing up the total length of core recovered in each run, counting only those pieces of core which are four inches (10 cm) in length or longer and which are hard and sound. The sum is then represented as a percentage over the length of the run. If the core is broken by handling or by the drilling process, the fresh broken pieces are fitted together and counted as one piece provided that they form the requisite length of four inches (10 cm). RQD is reported as a percentage.

RELATIVE OF RQD AND ROCK QUALITY

RQD (%)	Description of Rock Quality
0 to 25	Very Poor
25 to 50	Poor
50 to 75	Fair
75 to 90	Good
90 to 100	Excellent

NOTE: Recovery as denoted as REC = , is the length of core recovered in a run divided by the length of the run, reported as a percentage.

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

(ASTM: D 2487 and 2488)

Major divisions		Group symbols	Typical names	Laboratory classification criteria				
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 per cent GW, GP, SW, SP More than 12 per cent GM, GC, SM, SC 5 to 12 per cent Borderline cases requiring dual symbols	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3		
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW		
		Gravels with fines (Appreciable amount of fines)	GM	d		Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols
				u		Clayey gravels, gravel-sand-clay mixtures	Atterberg limits below "A" line or P.I. greater than 7	
		Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
				SP		Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW	
	Sands with fines (Appreciable amount of fines)		SM	d	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols.	
				u	Clayey sands, sand-clay mixtures	Atterberg limits below "A" line or P.I. greater than 7		
	Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	<p style="font-size: small;"> For classification of fine-grained soils and fine fraction of coarse-grained soils. Atterberg Limits plotting in hatched area are <i>borderline</i> classifications requiring use of dual symbols. Equation of A-line: $PI = 0.73(LL - 20)$ </p>			
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
OL			Organic silts and organic silty clays of low plasticity					
Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts					
		CH	Inorganic clays of high plasticity, fat clays					
		OH	Organic clays of medium to high plasticity, organic silts					
Highly organic soils		PI	Peat and other highly organic soil					



Greenbaum Associates, Inc.

HOLE No. B-1

Client: Oldham County Water District
 Project: Oldham County Dynergy Power Plant Oldham Co., KY
 Project No.: 04-149

Sheet 1 of 1

Boring Location: Surface Elevation: **Ground** Station: **n/a**
 Drilling Equipment: **CME-550 (ATV)** Drilling Method: **HSA**
 Depth to water immediately: **Dry** Overburden: **8.8** Rock: **0** Total Depth: **8.8**
 Logged By: **G. Hammond** Driller: **M. Wells** Date Logged: **5/31/05**

DEPTH (feet)	GRAPHIC LOG	SAMPLE NO.	RECOVERY %	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST											N VALUE
							● (blows/ft) PL — MC — LL											
					Topsoil (8")	Ground	10	20	30	40	50	60	70	80	90			
					Moist, Very Stiff, Red and Yellow, Mottled, Clay with Chert Fragments CH												22	
5		SS	61															
					Moist, Stiff, Yellowish-Brown, Clay with Ferromagnesian Nodules CH												14	
		SS	89															
					AUGER REFUSAL AT 8.8 FEET													

LOG WITH WELL AND SPT GRAPH 04-149.GPJ GREENBAUM.GDT 6/23/05

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube HQ - Rock Core, 2-1/2"	SAMPLER TYPE NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	DRILLING METHOD RW - Rotary Wash RC - Rock Core	Hole No. <p style="text-align: center;">B-1</p>
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Greenbaum Associates, Inc.

Client: Oldham County Water District
 Project: Oldham County Dynergy Power Plant Oldham Co., KY
 Project No.: 04-149

HOLE No. B-3

Sheet 1 of 1

Boring Location: _____ Surface Elevation: **Ground** Station: **n/a**
 Drilling Equipment: **CME-550 (ATV)** Drilling Method: **HSA/RC**
 Depth to water immediately: **Dry** Overburden: **8.4** Rock: **10** Total Depth: **18.4**
 Logged By: **G. Hammond** Driller: **M. Wells** Date Logged: **5/31/05**

DEPTH (feet)	GRAPHIC LOG	SAMPLE NO.	RECOVERY %	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST (blows/ft)											N VALUE			
							10	20	30	40	50	60	70	80	90						
0					Topsoil (8")	Ground															
5			78		Moist, Medium Stiff, Light Yellowish-Brown, Silty Clay with Ferromagnesian Nodules CL																7
5			78		Moist, Stiff, Yellowish-Brown, Clay with Ferromagnesian Nodules CH																10
10					BEGAN ROCK CORE #1 AT 8.4 FEET Light Yellowish-Gray Dolomite (8.4' - 9.2') Same, with Interbedded Shale and Clay (9.2' - 11.2')																
10			98	43	Light Gray Dolomite (11.2' - 12')																
10					Light Gray Dolomite, Interbedded with Dark Gray Shale (12' - 15.3')																
15					BEGAN ROCK CORE #2 AT 13.4 FEET Light Gray Dolomite, Interbedded with Dark Gray Shale (12' - 15.3')																
15			93	56	Light Gray Porous Dolomite (15.3' - 18.4')																
18.4					TERMINATED AT 18.4 FEET																

LOG WITH WELL AND SPT GRAPH 04-149.GPJ GREENBAUM.GDT 6/23/05

SAMPLER TYPE SS - Split Spoon ST - Shelby Tube HQ - Rock Core, 2-1/2"	NX - Rock Core, 2-1/8" CU - Cuttings CT - Continuous Tube	DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing	RW - Rotary Wash RC - Rock Core	Hole No. <p style="text-align: center;">B-3</p>
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Greenbaum Associates, Inc.

Client: Oldham County Water District	HOLE No. B-4
Project: Oldham County Dynergy Power Plant Oldham Co., KY	Sheet 1 of 1
Project No.: 04-149	

Boring Location:	Surface Elevation: Ground	Station: n/a
Drilling Equipment: CME-550 (ATV)	Drilling Method: HSA	
Depth to water immediately: Dry	Overburden: 4.5	Rock: 0 Total Depth: 4.5
Logged By: G. Hammond	Driller: M. Wells	Date Logged: 5/31/05

DEPTH (feet)	GRAPHIC LOG	SAMPLE NO.	RECOVERY %	ROD %	MATERIAL DESCRIPTION	ELEVATION (feet)	STANDARD PENETRATION TEST													N VALUE				
							● (blows/ft) PL — MC — LL 10 20 30 40 50 60 70 80 90																	
					Topsoil (7")	Ground																		
					Moist, Stiff, Yellowish-Brown, Clay with Ferromagnesian Nodules																			
		SS	72																					
					AUGER REFUSAL AT 4.5 FEET																			

LOG WITH WELL AND SPT GRAPH 04-149.GPJ GREENBAUM.GDT 6/23/05

SAMPLER TYPE SS - Split Spoon NX - Rock Core, 2-1/8" ST - Shelby Tube CU - Cuttings HQ - Rock Core, 2-1/2" CT - Continuous Tube	DRILLING METHOD HSA - Hollow Stem Auger RW - Rotary Wash CFA - Continuous Flight Augers RC - Rock Core DC - Driving Casing	Hole No. <h2 style="margin: 0;">B-4</h2>
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2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

CONSTRUCTION SPECIFICATIONS

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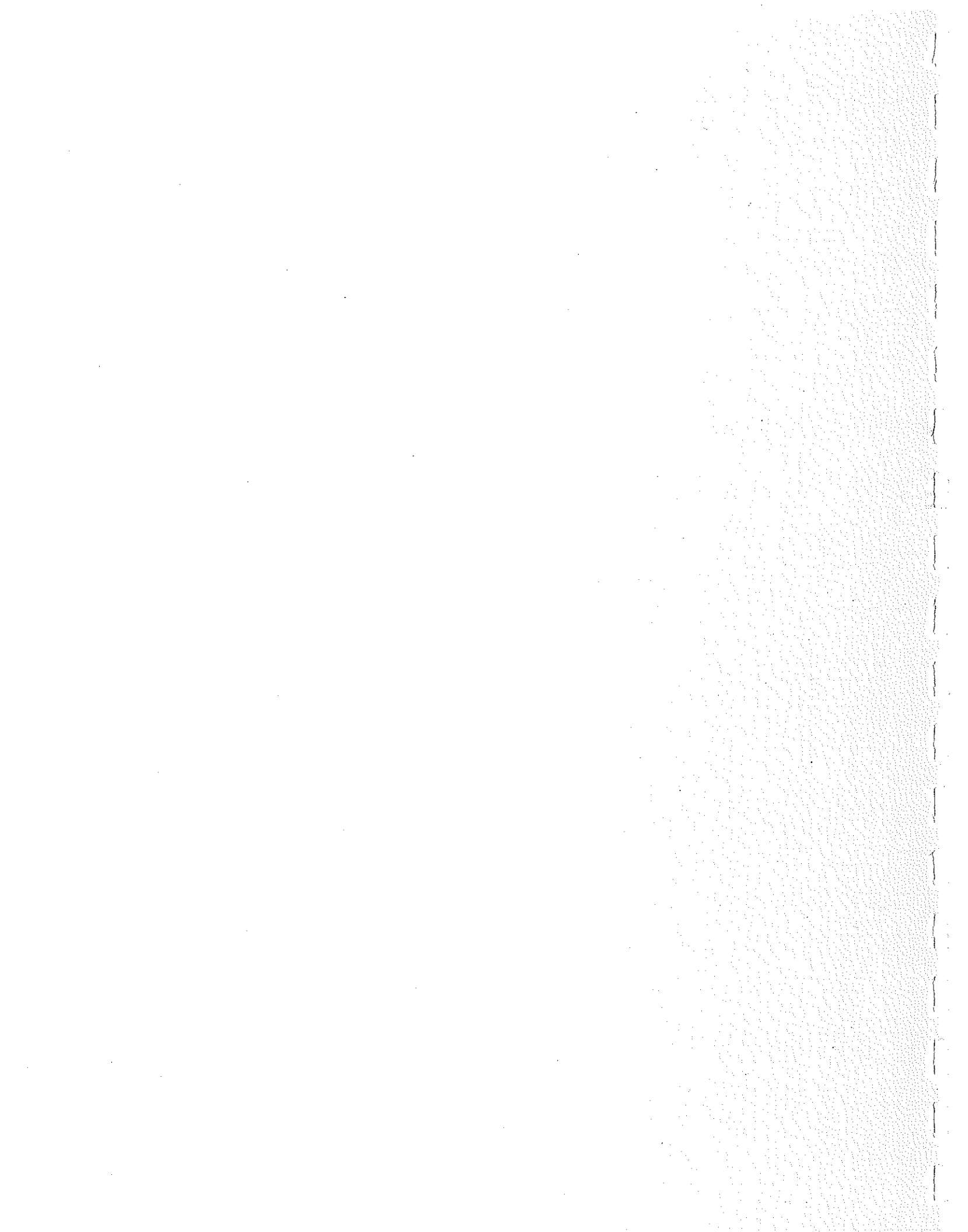
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DIVISION 1 – GENERAL REQUIREMENTS



2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

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01700 Project Closeout



SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED

- A. The work covered by these construction specifications consists of furnishing and installing the following:

Kentucky Highway 146 TANK

- B. Contractor shall furnish and install, test and place into operation the improvements and related appurtenances necessary to provide a complete and operational system in accordance with the design indicated by the plans, specifications and contract documents.
- C. The project contemplated by these plans and specifications is composed of one (1) contract of work to be completed on a furnish-and-install basis, as set forth in the bid schedule of the contract documents.
- D. The work in general to be carried out under the Contract is as described above and set forth in the "Special Conditions".
- E. Project Descriptions:

Kentucky Highway 146 Tank

This Contract consists generally of furnishing and installing one (1) composite water storage tank and appurtenances, including, but not limited to: Concrete foundations, concrete pedestal, shop steel fabrication, piping, erection, painting, site work, chain link fence, disinfection, flushing and etc., complete, all in accordance with the Engineer's plans, specifications and Bid Forms.

1.02 WORK SEQUENCE

- A. Construct work in stages and of the proper sequence to maintain the existing distribution system in full operation at all times.
- B. The Contractor shall start work and carry it on at such point or points and in such order of precedence and at times and seasons as may be deemed necessary by the Owner and as directed by the Engineer and shall complete the various parts of the work in accordance with the progress schedule approved by the Engineer.

1.03 COMMUNICATIONS

- A. No construction shall be commenced without approval of the Engineer and the Owner. When such approval is requested, the Contractor shall advise as to method of operations, materials and equipment on hand to do the work, and estimate completion time to allow proper scheduling of system operations.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit Shop Drawings, Product Data and Samples required by Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Definitions, and Additional Responsibilities of Parties: Conditions of the Contract.
- B. Designate in a separate coordinated schedule, the dates for submission and the dates that reviewed Shop Drawings, Product Data and Samples will be needed.

1.03 SHOP DRAWINGS

- A. Drawings shall be presented in a clear and thorough manner.
 - 1. Details shall be identified by reference to sheet and detail, schedule or item numbers or titles shown on Contract Drawings.

1.04 PRODUCT DATA

- A. Preparation:
 - 1. Clearly mark each copy to identify pertinent products or models.
 - 2. Show performance characteristics and capacities.
 - 3. Show dimensions and clearances required.
 - 4. Show wiring or piping diagrams and controls.
- B. Manufacturer's standard schematic drawings and diagrams:
 - 1. Modify drawings and diagrams to delete information which is not applicable to the Work.
 - 2. Supplement standard information to provide information specifically applicable to the Work.

1.05 SAMPLES

- A. Office samples shall be of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of the product, with integrally related parts and attachment devices.
 - 2. Full range of color, texture and pattern.

1.06 CONTRACTOR RESPONSIBILITIES

- A. Review Shop Drawings, Product Data and Samples prior to submission.
- B. Determine and verify:
 - 1. Field measurements.
 - 2. Field construction criteria.

3. Catalog numbers and similar data.
 4. Conformance with specifications.
- C. Coordinate each submittal with requirements of the Work and of the Contract Documents.
- D. Notify the Architect/Engineer in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
- E. Begin no fabrication or work which requires submittals until return of submittals with Architect/Engineer approval.

1.07 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.
- B. Number of submittals required:
1. Shop Drawings: Submit a minimum of 5 copies of all submittals for use as follows:
 - a) Owner's file
 - b) Inspector's field copy
 - c) Engineer's file
 - d) Contractor's office copy
 - e) Contractor's field copy
 2. Additional copies may be submitted if required by sub-contractors, fabricators or suppliers.
- C. Submittals shall contain:
1. The date of submission and the dates of any previous submissions.
 2. The Project title and number.
 3. Contract identification.
 4. The names of:
 - a. Contractor
 - b. Supplier
 - c. Manufacturer
 5. Identification of the product, with the specification section number.
 6. Field dimensions, clearly identified as such.
 7. Relation to adjacent or critical features of the Work or materials.
 8. Applicable standards, such as ASTM, or Federal Specification numbers.
 9. Identification of deviations from Contract Documents.
 10. Identification of revisions on resubmittals.
 11. A 5 in. x 3 in. blank space for Contractor and Architect/Engineer stamps.
 12. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

1.08 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals required by the Architect/Engineer and resubmit until approved.
- B. Shop Drawings and Product Data:
 - 1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
 - 2. Indicate any changes which have been made other than those requested by the Architect/Engineer.
- C. Samples: Submit new sample as required for initial submittal.

1.09 ARCHITECT/ENGINEER DUTIES

- A. Review submittals within two weeks after receiving them.
- B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or approval of submittal.
- C. Return submittals to Contractor for distribution, or for resubmission.

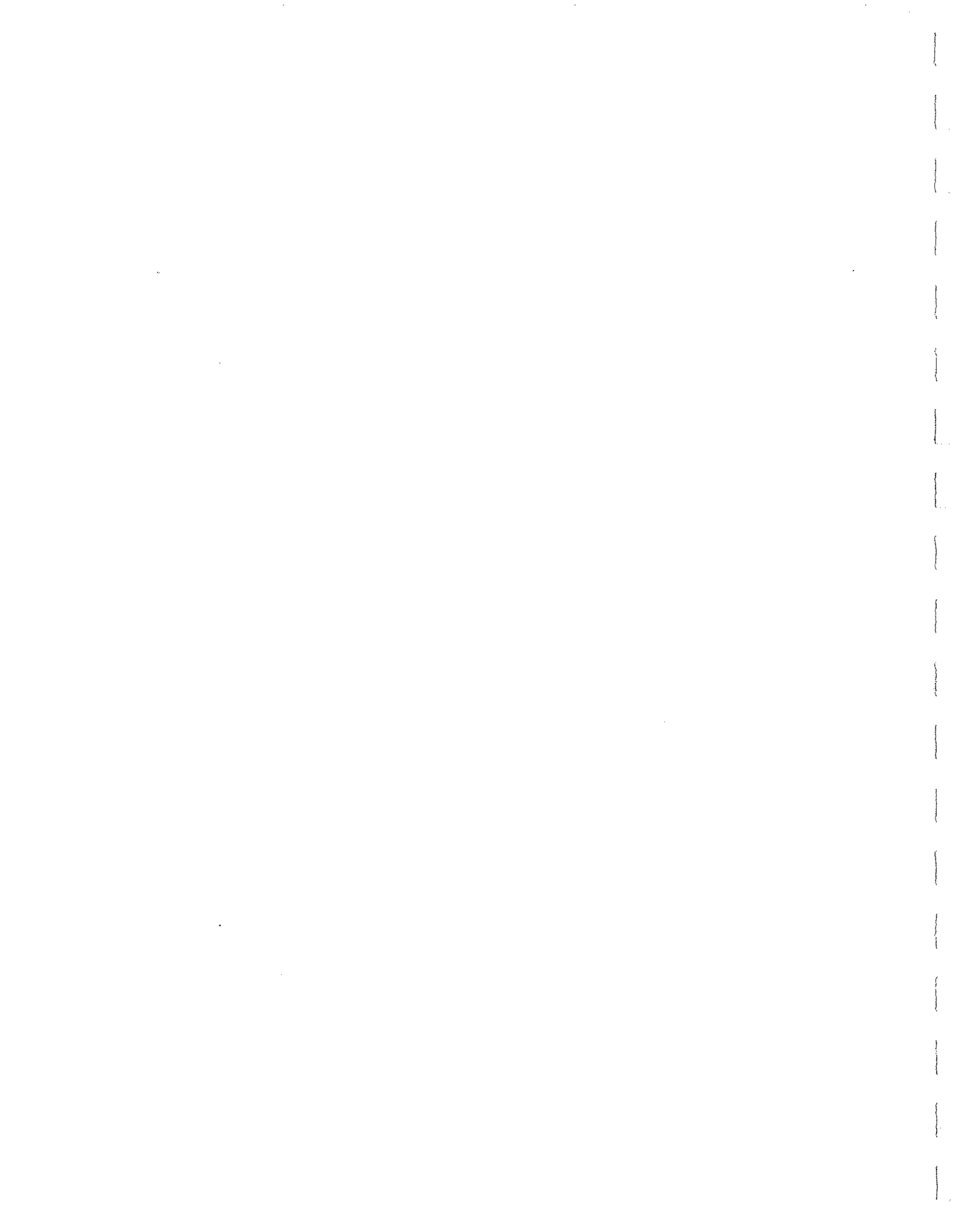
PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION



SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. General Quality Control
- B. Manufacturers' Field Services

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Inspection and testing required by governing authorities.

1.03 QUALITY CONTROL, GENERAL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

1.04 MANUFACTURERS' FIELD SERVICES

- A. When specified in respective Specification sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable and to make appropriate recommendations.
- B. Representative shall submit written report to Architect/Engineer listing observations and recommendations.

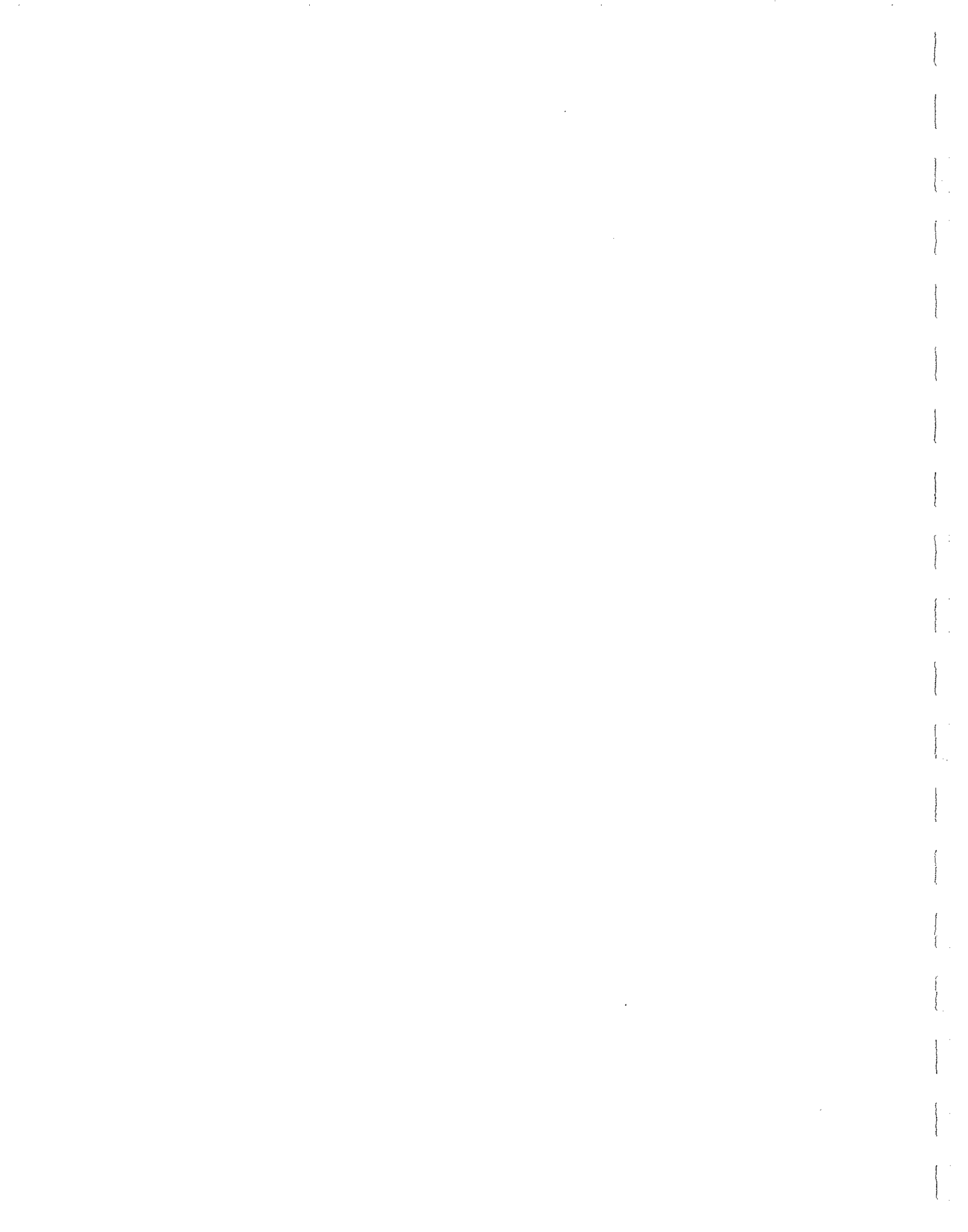
PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION



SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall employ and pay for the services of an Independent Testing Laboratory to perform specified services and testing.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
- B. Related requirements specified in other sections.
- C. Respective sections of specifications: Certification of products.
- D. Each specification section listed: Laboratory tests required, and standards for testing.

1.03 QUALIFICATION OF LABORATORY

- A. Meet "Recommended Requirements for Independent Laboratory Qualification", published by American Council of Independent Laboratories.
- B. Meet basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction".
- C. Authorized to operate in the State in which the Project is located.
- D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- E. Testing Equipment:
 - 1. Calibrated at reasonable intervals by devices of accuracy traceable to either:
 - a. National Bureau of Standards
 - b. Accepted values of natural physical constants.

1.04 LABORATORY DUTIES

- A. Cooperate with Architect/Engineer and Contractor; provide qualified personnel after due notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 - 1. Comply with specified standards.

2. Ascertain compliance of materials with requirements of Contract Documents.
- C. Promptly notify Architect/Engineer and Contractor of observed irregularities or deficiencies of work or products.
 - D. Promptly submit five (5) copies of written report of each test and inspection to Architect/Engineer.
 - E. Promptly submit written report of each test and inspection; one copy each to Architect/Engineer, Owner, Contractor, and one copy to Record Documents File. Each report shall include:
 1. Date issued.
 2. Project title and number.
 3. Testing laboratory name, address and telephone number.
 4. Name and signature of laboratory inspector.
 5. Date and time of sampling or inspection.
 6. Record of temperature and weather conditions.
 7. Date of test.
 8. Identification of product and specification section.
 9. Location of sample or test in the Project.
 10. Type of inspection or test.
 11. Results of tests and compliance with Contract Documents.
 12. Interpretation of test results, when requested by Architect/Engineer.
 - F. Perform additional tests as required by Architect/Engineer or the Owner.

1.05 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 2. Approve or accept any portion of the work.
 3. Perform any duties of the Contractor.

1.06 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, provide access to work, to manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.
- D. Furnish copies of products test reports as required.
- E. Furnish incidental labor and facilities:
 1. To provide access to work to be tested.

2. To obtain and handle samples at the Project site or at the source of the product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- G. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required:
1. For the Contractor's convenience.
 2. When initial tests indicate work does not comply with Contract Documents.
- H. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.
- I. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with Contract Documents.

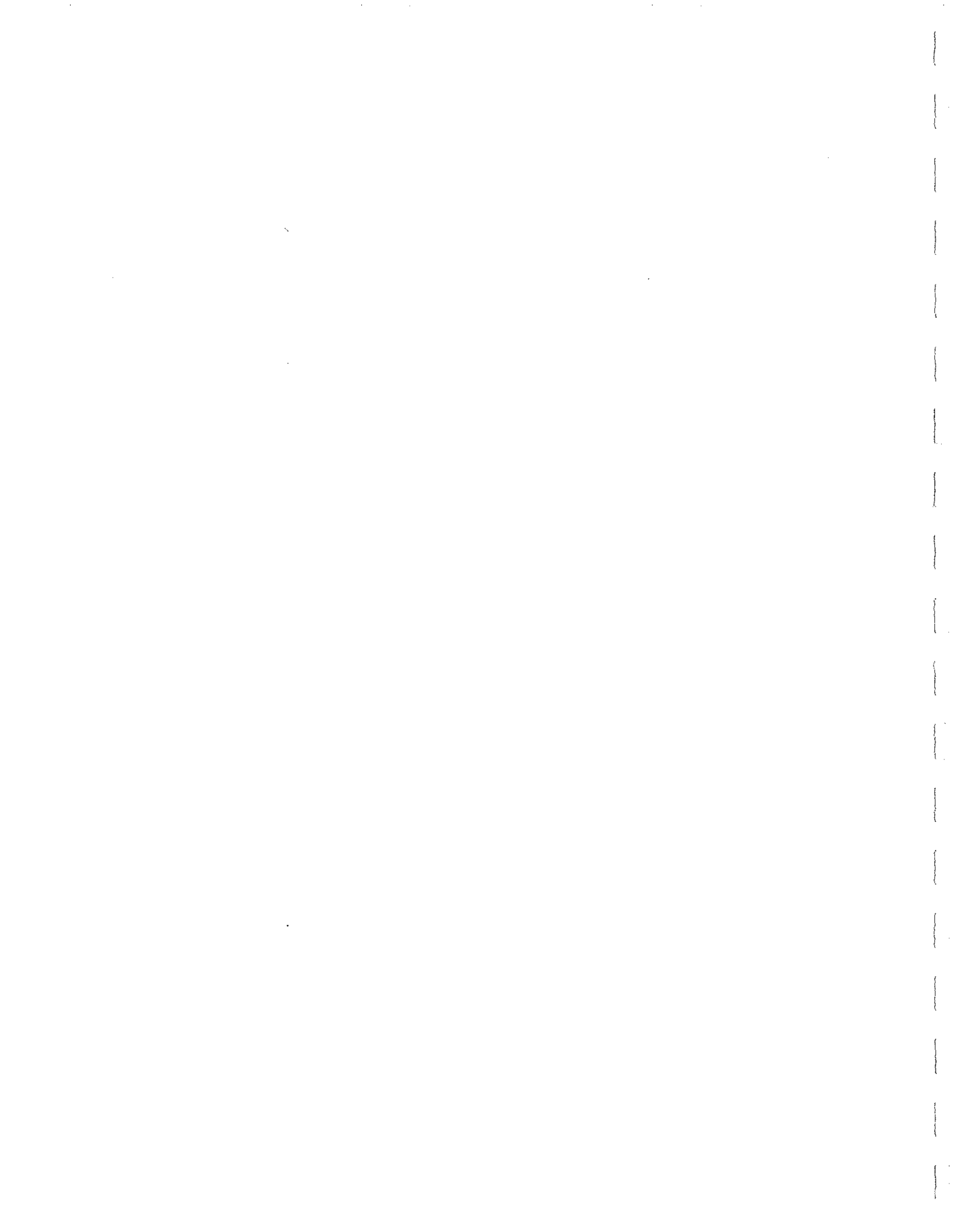
PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION



SECTION 01530

BARRIERS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain suitable barriers as required to prevent public entry, and to protect the work, existing facilities, trees and plants from construction operations; remove when no longer needed, or at completion of work.

1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 FENCING

- A. Materials to Contractor's option, minimum fence height 6 feet.

2.03 BARRIERS

- A. Materials to Contractor's option, as appropriate to serve required purpose.

PART 3 EXECUTION

3.01 GENERAL

- A. Install facilities of a neat and reasonable uniform appearance, structurally adequate for required purposes.
- B. Maintain barriers during entire construction period.
- C. Relocate barriers as required by progress of construction.

3.02 TREE AND PLANT PROTECTION

- A. Preserve and protect existing trees and plants at site which are designated to remain, and those adjacent to site.
- B. Consult with Architect/Engineer, and remove agreed-on roots and branches which interfere with construction.
 - 1. Employ qualified tree surgeon to remove, and to treat cuts.
- C. Protect root zones of trees and plants:
 - 1. Do not allow vehicular traffic or parking.

2. Do not store materials or products.
 3. Prevent dumping of refuse or chemically injurious materials or liquids.
 4. Prevent puddling or continuous running water.
- D. Carefully supervise excavating, grading and filling, and subsequent construction operations, to prevent damage.
- E. Replace, or suitably repair, trees and plants designated to remain which are damaged or destroyed due to construction operations.

3.03 REMOVAL

- A. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by the Architect/Engineer.
- B. Clean, repair damage caused by installation, fill and grade areas of the site to required elevations and slopes, and clean the area.

END OF SECTION

SECTION 01535

PROTECTION AND REPAIR OF PRIVATE PROPERTY

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install all material and labor required to protect and/or repair all damaged private property.

1.02 RELATED REQUIREMENTS

- A. Section 01530: Barriers

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Materials shall be new, and suitable for the intended purpose.

2.02 FENCING

- A. New fence materials shall be used that match the type of fence being repaired.

2.03 TILE

- A. New tile of the same size and quality of the existing cut tile shall be used.

PART 3 EXECUTION

3.01 GENERAL

- A. Install repairs in neat appearance and with good workmanship.
- B. No additional compensation shall be made to the Contractor for this work.
- C. The Contractor shall conduct the construction within the acquired easements. At no time shall Contractor's equipment be outside the temporary construction easement unless written permission is received from the property owner.

3.02 FENCES

- A. All cutting of fence shall be avoided if possible.
- B. Fences shall be let down from existing splices or corner post if possible.
- C. The repairs to the fence shall be installed to match the existing fence and to the satisfaction of the property owner, Owner and Engineer.

3.03 DRAINAGE TILE

- A. Drainage tile which is broken or damaged in any way during the construction of the water mains shall be replaced for a distance of two (2) feet each side of trench with a section of solid PVC SDR 26 pipe of the same diameter, with each end connected using a repair clamp. When the length of repair pipe is seven (7) feet or longer, the replacement pipe shall be installed with pea gravel backfill from bottom of trench to 6" above top of replacement pipe and one (1) foot each way from the centerline of replacement pipe along the trench. In all cases, the repair of drainage tile shall be to the satisfaction of the Engineer.

END OF SECTION

SECTION 01540

SECURITY

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide a project security program, to:
 - 1. Protect work, stored products and construction equipment from theft and vandalism.
 - 2. Protect premises from entry by unauthorized persons.

1.02 RELATED REQUIREMENTS

- A. Section 01530 - Barriers
- B. Section 01610 - Product Handling
- C. Section 01620 - Storage and Protection

1.03 MAINTENANCE OF SECURITY

- A. Initiate security program promptly after job mobilization, when enclosure fence and gate are installed.
- B. Maintain security program throughout construction period, until Owner occupancy or Owner acceptance precludes the need for Contractor security.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION



SECTION 01560

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide and maintain methods, equipment and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under Contractor's control; remove physical evidence of temporary facilities at completion of work.

1.02 DUST CONTROL

- A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations, and provide positive means to prevent air-borne dust from dispersing into the atmosphere.

1.03 WATER CONTROL

- A. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.
 - 1. Control fill, grading and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff.
- B. Provide, operate and maintain hydraulic equipment of adequate capacity to control surface water.
- C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas.

1.04 RODENT CONTROL

- A. Provide rodent control as necessary to prevent infestation of construction or storage area.
 - 1. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.
 - 2. Should the use of rodenticides be considered necessary, submit an informational copy of the proposed program to Owner with a copy to Architect/Engineer. Clearly indicate:
 - a. The area or areas to be treated.
 - b. The rodenticides to be used, with a copy of the manufacturer's printed instructions.
 - c. The pollution preventative measures to be employed.
- B. The use of any rodenticide shall be in full accordance with the manufacturer's printed instructions and recommendations.

1.05 DEBRIS CONTROL

- A. Maintain all areas under Contractor's control free of extraneous debris.
- B. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
 - 1. Provide containers for deposit of debris.
 - 2. Prohibit overloading of trucks to prevent spillages on access and haul routes.
 - a. Provide periodic inspection of traffic areas to enforce requirements.
- C. Schedule periodic collection and disposal of debris.
 - 1. Provide additional collections and disposals of debris whenever the periodic schedule is inadequate to prevent accumulation.

1.06 POLLUTION CONTROL

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
- B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
 - 1. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.
- C. Take special measures to prevent harmful substances from entering public waters.
 - 1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants.
 - 1. Prevent toxic concentrations of chemicals.
 - 2. Prevent harmful dispersal of pollutants into the atmosphere.

1.07 EROSION CONTROL

- A. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - 1. Hold the areas of bare soil exposed at one time to a minimum.
 - 2. Provide temporary control measures such as berms, dikes, drains, or temporary seeding.
- B. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.
- C. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

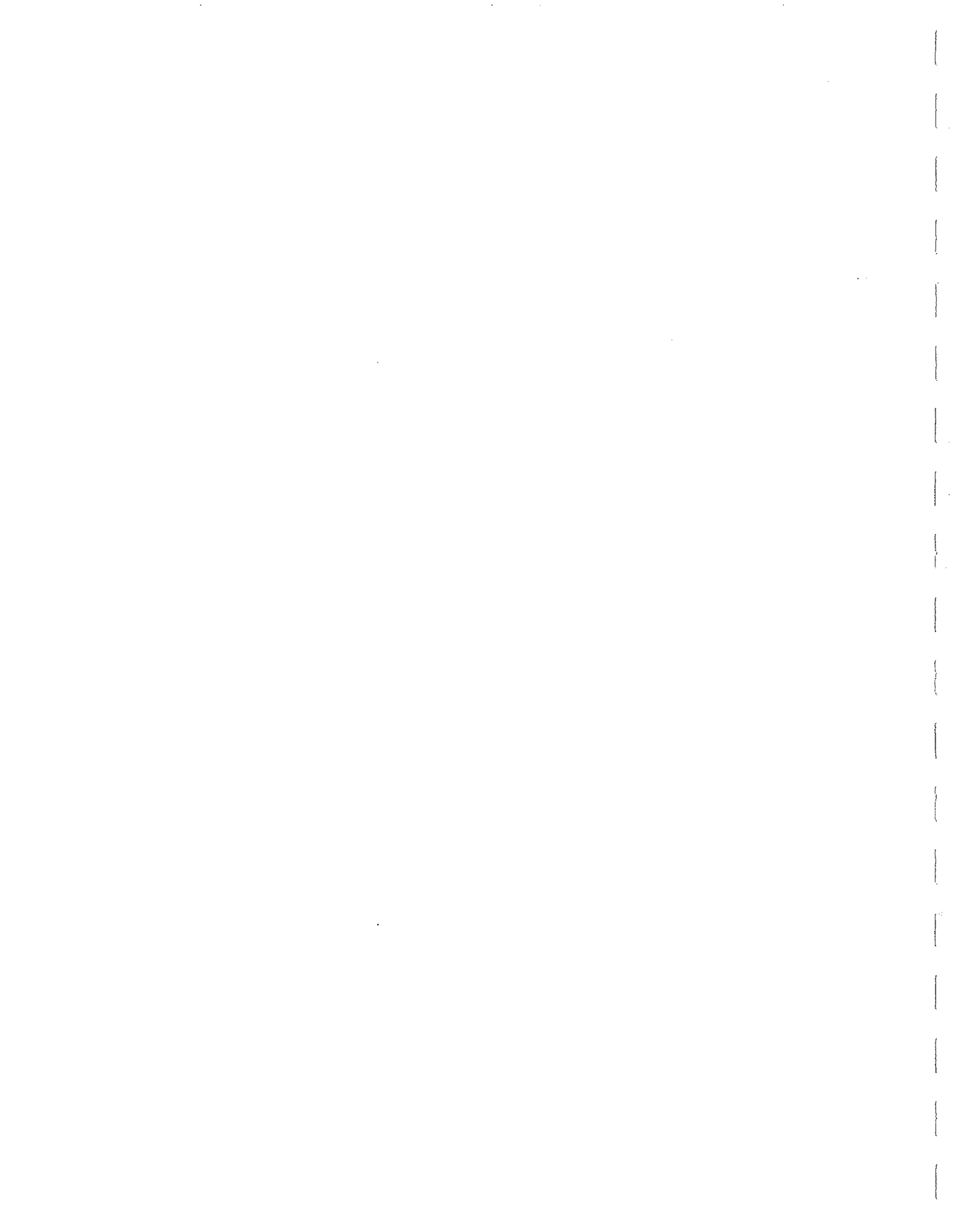
PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION



SECTION 01570

TRAFFIC REGULATIONS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide, operate and maintain equipment, services and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow on haul routes, at site entrances, on-site access roads, and parking areas.
- B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.02 TRAFFIC SIGNALS AND SIGNS

- A. Provide and operate traffic control and directional signals required to direct and maintain an orderly flow of traffic in all areas under Contractor's control, or affected by Contractor's operations
- B. Provide traffic control and directional signs, mounted on barricades or standard posts.
 - 1. At each change of direction of a roadway and at each crossroads.
 - 2. At detours.
 - 3. At parking areas.

1.03 FLAGMEN

- A. Provide qualified and suitably equipped flagmen when construction operations encroach on traffic lanes, as required for regulation of traffic.

1.04 FLARES AND LIGHTS

- A. Provide flares and lights during periods of low visibility.
 - 1. To clearly delineate traffic lanes and to guide traffic.
 - 2. For use by flagmen in directing traffic.
- B. Provide illumination of critical traffic and parking areas.

1.05 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations..
- B. Monitor parking or construction personnel's private vehicles.
 - 1. Maintain free vehicular access to and through parking areas.
 - 2. Prohibit parking on or adjacent to access roads, or in non-designated areas.

1.06 HAUL ROUTES

A. Consult with governing authorities, establish public thoroughfares which will be used as haul routes and site access.

B. Confine construction traffic to designated haul routes.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Products
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

1.02 RELATED SECTIONS

- A. Instructions to Bidders
- B. Section 01400 - Quality Control

1.03 PRODUCTS

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacture, for components being replaced.

1.04 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.05 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturers' instructions, with seals and labels intact and legible.
- B. Store sensitive products in weather tight, climate controlled enclosures.
- C. For exterior storage of fabricated products, place on sloped supports, above ground.

- D. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.
- F. Store loose granular materials on solid flat surfaces in a well drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.06 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.07 SUBSTITUTIONS

- A. Architect/Engineer will consider requests for substitutions only within fifteen (15) days after date established in Notice to Proceed.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request constitutes a representation that the contractors:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Submit three (3) copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The Architect/Engineer will notify contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION



SECTION 01610

PRODUCT HANDLING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Transportation and Handling: Material shipments to job site.
- B. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.02 DELIVERY

- A. Deliver materials, supplies or equipment to project site during working hours.
- B. Deliveries made during other than normal working hours must be received by an authorized agent of Contractor involved or be received by other means which shall be the sole responsibility of that Contractor.
- C. No employee of the Owner is authorized to receive any shipment designated for this Project.
- D. The Owner assumes no responsibility for receiving any shipments designated for this Project.
- E. Any materials delivered in the presence of Owner's representative shall be accounted for by the respective contractor.
- F. Under no circumstances may shipments be directed to or in care of the Owner.

1.03 HANDLING

- A. General Contractor, Subcontractor, Manufacturer, or Supplier furnishing materials under this Contract shall identify, ship, address, consign, etc., all such materials to the Contractor who may be charged therewith by giving the name of the Contractor, the name of the Project, the street or post office address and the city.

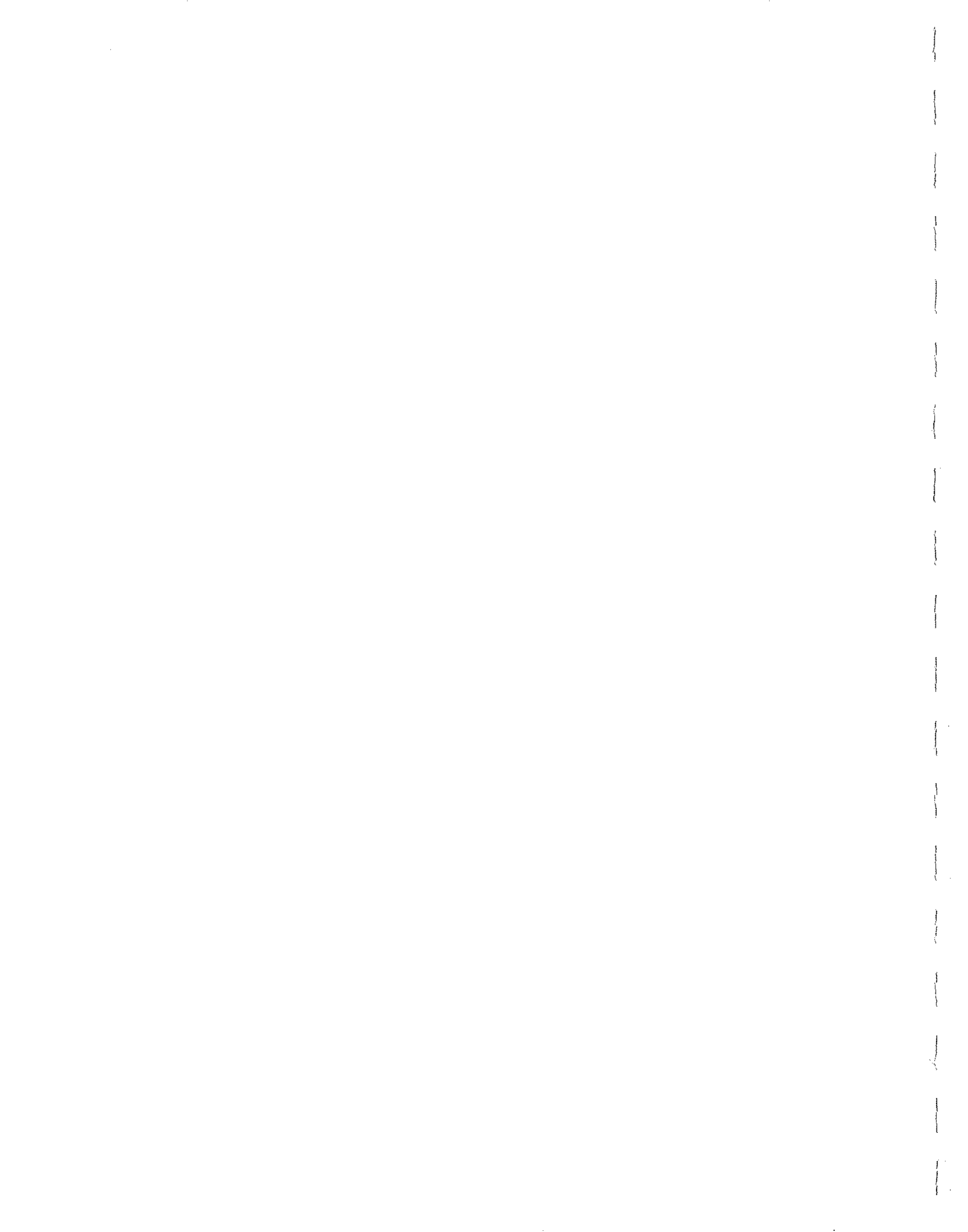
PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION



SECTION 01620

STORAGE AND PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Provide secure storage and protection for products to be incorporated into the work, and maintenance and protection for products after installation and until completion of the work.

1.02 STORAGE

- A. Store products immediately on delivery, and protect until installed in the work.
 - 1. Store in accord with manufacturer's instructions, with seals and labels intact and legible.
- B. Store products subject to damage by elements in substantial weather tight enclosures.
 - 1. Maintain temperature within ranges required by manufacturer's instructions.
 - 2. Provide humidity control for sensitive products, as required by manufacturer's instructions.
 - 3. Store unpacked products on shelves, in bins or in neat piles, accessible for inspection.
- C. Exterior Storage:
 - 1. Provide substantial platforms, blocking or skids to support fabricated products above ground, prevent soiling or staining.
 - a. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
 - 2. Store loose granular materials on solid surfaces such as paved areas, or provide plywood or sheet materials to prevent mixing with foreign matter.
 - a. Provide surface drainage to prevent flow or ponding of rainwater.
 - b. Prevent mixing of refuse or chemically injurious materials or liquids.
- D. Arrange storage in manner to provide easy access for inspection.

1.03 MAINTENANCE OF STORAGE

- A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
 - 1. State of storage facilities is adequate to provide required conditions.
 - 2. Required environmental conditions are maintained on continuing basis.
 - 3. Surfaces of products exposed to elements are not adversely affected.

a. Any weathering of products, coatings and finishes is acceptable under requirements of Contract Documents.

B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.

1. Comply with manufacturer's instructions on scheduled basis.

1.04; PROTECTION AFTER INSTALLATION

A. Provide protection of installed materials to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of Work.

B. Control traffic to prevent damage to material and surfaces.

C. Lawns and landscaping.

1. Prohibit traffic of any kind across seeded lawn and sodded areas.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01700

PROJECT CLOSEOUT

PART 1 GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Time of Final Payment: Standard Agreement for Construction Projects.
- B. Completion; Waiver of Claims: General Conditions.

1.02 SUBSTANTIAL COMPLETION

- A. Submit written certification to Engineer that project or designated portion of project is substantially complete.
- B. The Engineer, Contractor, and Owner will make an inspection within seven (7) days after receipt of certification.
- C. Should Engineer consider that work is substantially complete:
 - 1. Contractor shall prepare and submit to Engineer a list of items to be completed or corrected as determined by the inspection.
 - 2. Engineer will prepare and issue a Certificate of Substantial Completion, complete with signatures of Engineer, Owner and Contractor, accompanied by Contractor's list of items to be completed or corrected as verified and amended by the Engineer.
 - 3. Owner occupancy of project or designated portion of project:
 - a. Owner will occupy project under provisions stated in Certificate of Substantial Completion.
 - 4. Contractor: Complete work listed for completion or correction within designed time stated on Certificate of Substantial Completion.
- D. Should Engineer consider that work is not substantially complete:
 - 1. He shall immediately notify Contractor, in writing, stating reasons.
 - 2. Contractor: Complete work and send second written notice to Engineer certifying that project or designated portion of project is substantially complete.
 - 3. Engineer will reinspect work.

1.03 FINAL INSPECTION

- A. A prefinal inspection will be held to determine the final punch list.
- B. Contractor shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been completed and inspected in accordance with Contract Documents.
 - 3. Equipment and systems have been tested in presence of Owner's representative and are operational.

4. Project is completed and ready for final inspection.

C. Engineer will make final inspection within seven (7) days after receipt of certification.

D. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make project closeout submittals.

E. Should Engineer consider that work is not finally complete:
1. He shall notify contractor, in writing, stating reasons.
2. Contractor shall take immediate steps to remedy the stated deficiencies and send second written notice to Engineer certifying that work is complete.
3. Engineer will reinspect work.

1.04 SUBMITTALS

A. Record Drawings:

1. Contractor shall: Keep up to date one (1) set of prints on the project at all time with all changes, errors, deviations, omissions and all corrections noted plainly therein.
2. After acceptance of the project by Owner, certify on title sheet that the information contained is true and accurate.
3. Submit "Record Drawings" on one (1) complete set of prints to Engineer prior to certification of final payment.

PART 2 PRODUCTS

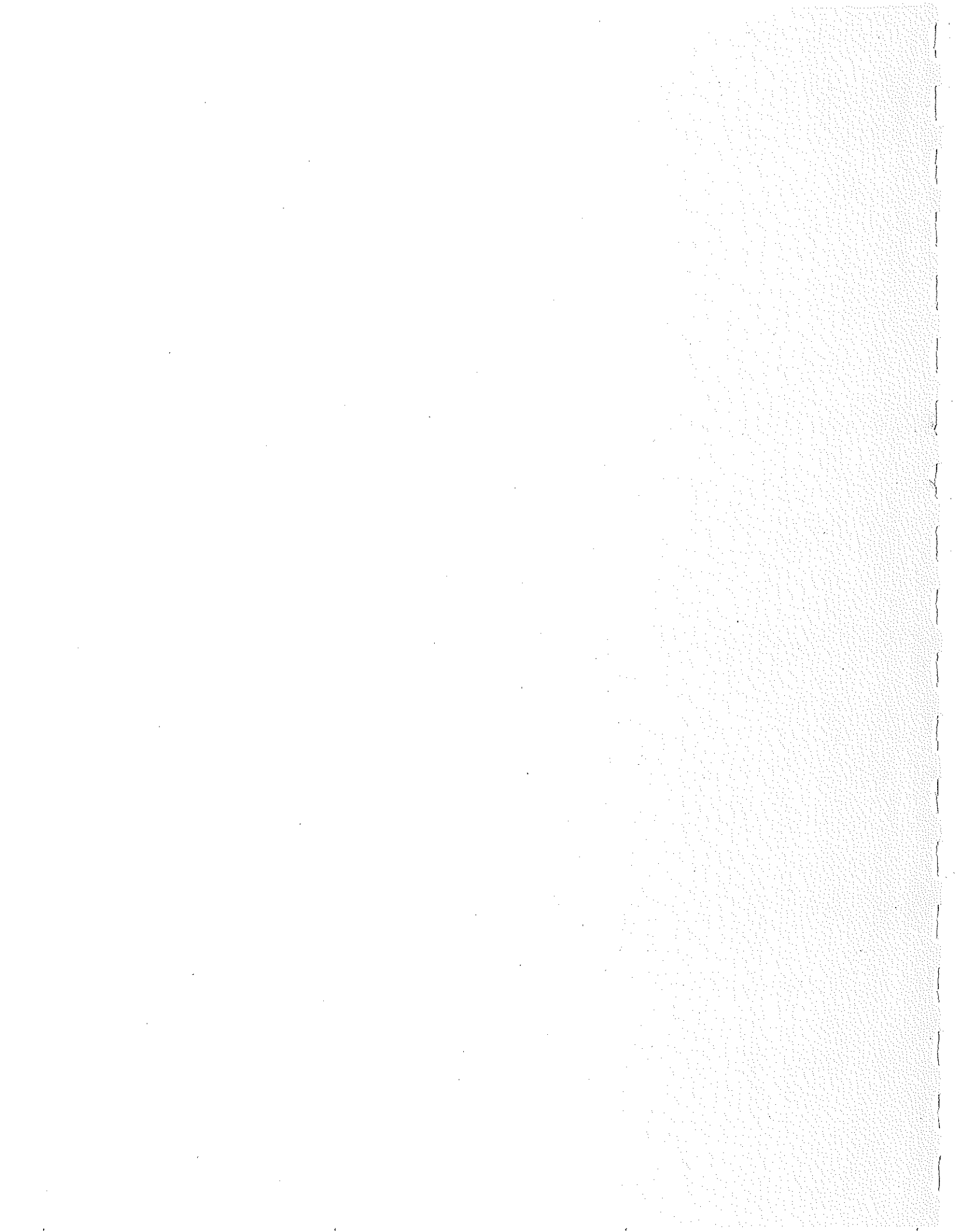
Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

DIVISION 2 – SITE WORK



2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

CONSTRUCTION SPECIFICATIONS

** INDEX **

SECTION

DIVISION 2 - SITE WORK

02110	Clearing
02210	Site Grading
02215	Excavation
02220	Backfilling
02221	Trenching
02229	Rock Removal
02485a	Seeding
02831	Chain Link Fences and Gates



SECTION 02110

CLEARING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Clear required sites of plant life and grass.
- B. Remove root system of trees and shrubs.
- C. Remove surface debris.

1.02 RELATED WORK

- A. Section 02210 - Site Grading.
- B. Section 02215 - Excavation.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable State and Local codes for disposal of debris.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 CLEARING

- A. Clear areas required for access to site and execution of work.
- B. Remove trees and shrubs within designated areas. Grub out stumps, roots, and surface rock.
- C. Clear undergrowth and deadwood.

3.02 PROTECTION

- A. Protect existing plant growth and features to remain upon completion of construction.
- B. Protect bench marks and existing work from damage or displacement.
- C. Maintain designated site access for vehicle and pedestrian traffic.

3.03 REMOVAL

- A. Remove debris from site.

END OF SECTION



SECTION 02210

SITE GRADING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Remove topsoil and stockpile for later reuse.
- B. Excavate subsoil and stockpile for later reuse.
- C. Grade and rough contour site.

1.02 RELATED WORK

- A. Section 02110 - Clearing
- B. Section 02215 - Excavation
- C. Section 02220 - Backfilling
- D. Section 02221 - Trenching

1.03 PROJECT RECORD DOCUMENTS

- A. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 PROTECTION

- A. Protect trees, shrubs, lawns, rock outcropping, and other features remaining as portion of final landscaping.
- B. Protect bench marks, existing structures, roads.
- C. Protect above or below grade utilities which are to remain.
- D. Repair damage.

1.05 TIME CONSTRAINTS

- A. Contractor shall complete site grading within 90 days after installation of facilities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Topsoil: Excavated material, graded free of roots, rocks larger than one inch subsoil, debris, and large weeds. See also Section 02485a - Seeding.

- B. Subsoil: Excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches and debris.

PART 3 EXECUTION

3.01 PREPARATION

- A. Maintain and protect existing utilities remaining which pass through work area.
- B. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.

3.02 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded and stockpile in area designated on site.
- B. Do not excavate wet topsoil.
- C. Stockpile topsoil to depth not exceeding 8 feet. Cover to protect from erosion.

3.03 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be relandscaped or regraded and stockpile in area designated on site.
- B. Do not excavate wet subsoil.
- C. Stockpile subsoil to depth not exceeding 8 feet.

END OF SECTION

SECTION 02215

EXCAVATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. General excavation
- B. Dewatering
- C. Shoring excavations

1.02 RELATED WORK

- A. Section 01400 - Quality Control: 01410 - Testing Laboratory Services.
- B. Section 02210 - Site Grading
- C. Section 02220 - Backfilling
- D. Section 02221 - Trenching
- E. Section 03300 - Cast-in-Place Concrete

1.03 PROTECTION

- A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
- B. Underpin adjacent structures which may be damaged by excavation work.
- C. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- D. Grade excavation top perimeter to prevent surface water run-off into excavation.

1.04 CLASSIFICATION

- A. The excavation on this project is considered to be unclassified. The Contractor shall remove all unacceptable materials encountered.

1.05 QUALITY ASSURANCE

- A. The Contractor shall employ the services of a qualified soils engineer to conduct in place testing and make recommendations for over excavation, backfill and dewatering.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Subsoil: Excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches and debris.
- B. Pea Gravel: Mineral aggregate graded 1/4 inch (6 mm) to 5/8 inch (16 mm); free of soil, subsoil, clay, shale, or foreign matter.

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.

3.02 EXCAVATION

- A. Excavate subsoil required for structure slabs, construction operations, and other work.
- B. All excavated material shall be piled in a manner that will not hamper the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Ditches shall be kept clear or other satisfactory provisions made for road drainage, and natural watercourses shall not be obstructed.
- C. Correct unauthorized excavation at no cost to Owner.
- D. Fill over-excavated areas under structure bearing surfaces as directed by the Engineer.

3.03 DEWATERING

- A. Where required, dewatering will be performed, as directed by the Contractor's Soils Engineer and approved by the Engineer. Cost shall be included in the applicable unit price of the base bid.

3.04 FIELD QUALITY CONTROL

- A. Provide for visual inspection of bearing surfaces.

END OF SECTION

SECTION 02220

BACKFILLING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Compaction requirements

1.02 RELATED WORK

- A. Section 02221 - Trenching

1.03 REFERENCES

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

PART 2 PRODUCTS

2.01 SELECT FILL MATERIALS

- A. Type A - Coarse Stone: Gravel: Pit run, angular, crushed, washed natural stone; free of shale, clay, friable materials and debris; graded in accordance with ANSI/ASTM C136 within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
2 inches (50 mm)	100
1 inch (25 mm)	95
3/4 inch (19 mm)	95 to 100
5/8 inch (16 mm)	75 to 100
3/8 inch (9 mm)	55 to 85
No. 4	35 to 60
No. 16	15 to 35
No. 40	10 to 25
No. 200	5 to 10

- B. Type B - Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; 1/4 inch minimum to 5/8 inch maximum size; graded in accordance with ANSI/ASTM C136.

- C. Type C - Sand: Natural river or bank sand; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136 within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

2.02 COMMON BACKFILL

- A. When the type of backfill material is not indicated on the drawings or specified, the Contractor may backfill with the excavated material, provided that such material consists of loam, clay, sand, gravel or other materials that, in the opinion of the Engineer, are suitable for backfilling. If excavated material is indicated on the drawings or specified for backfill, and there is a deficiency due to a rejection or part thereof, the Contractor shall furnish the required amount of sand, gravel, or other approved material.
- B. All backfill material, unless otherwise specified, shall be free from cinders, ashes, refuse, vegetable and organic material, boulders, rocks or stone or other material that in the opinion of the Engineer is unsuitable.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify stockpiled fill to be reused is approved.
- B. Verify areas to be backfilled are free of debris, snow, ice, or water, and ground surfaces are not frozen.
- C. All disturbed areas shall be restored to at least preconstruction conditions.
- D. Verify underground tank anchoring to foundation slab to avoid flotation after backfilling.

3.02 PREPARATION

- A. When necessary, compact subgrade surfaces to density requirements for backfill materials.
- B. Cut out soft areas of subgrade not readily capable of insitu compaction. Backfill with Type A and compact to density equal to requirements for subsequent backfill material.

3.03 BACKFILLING

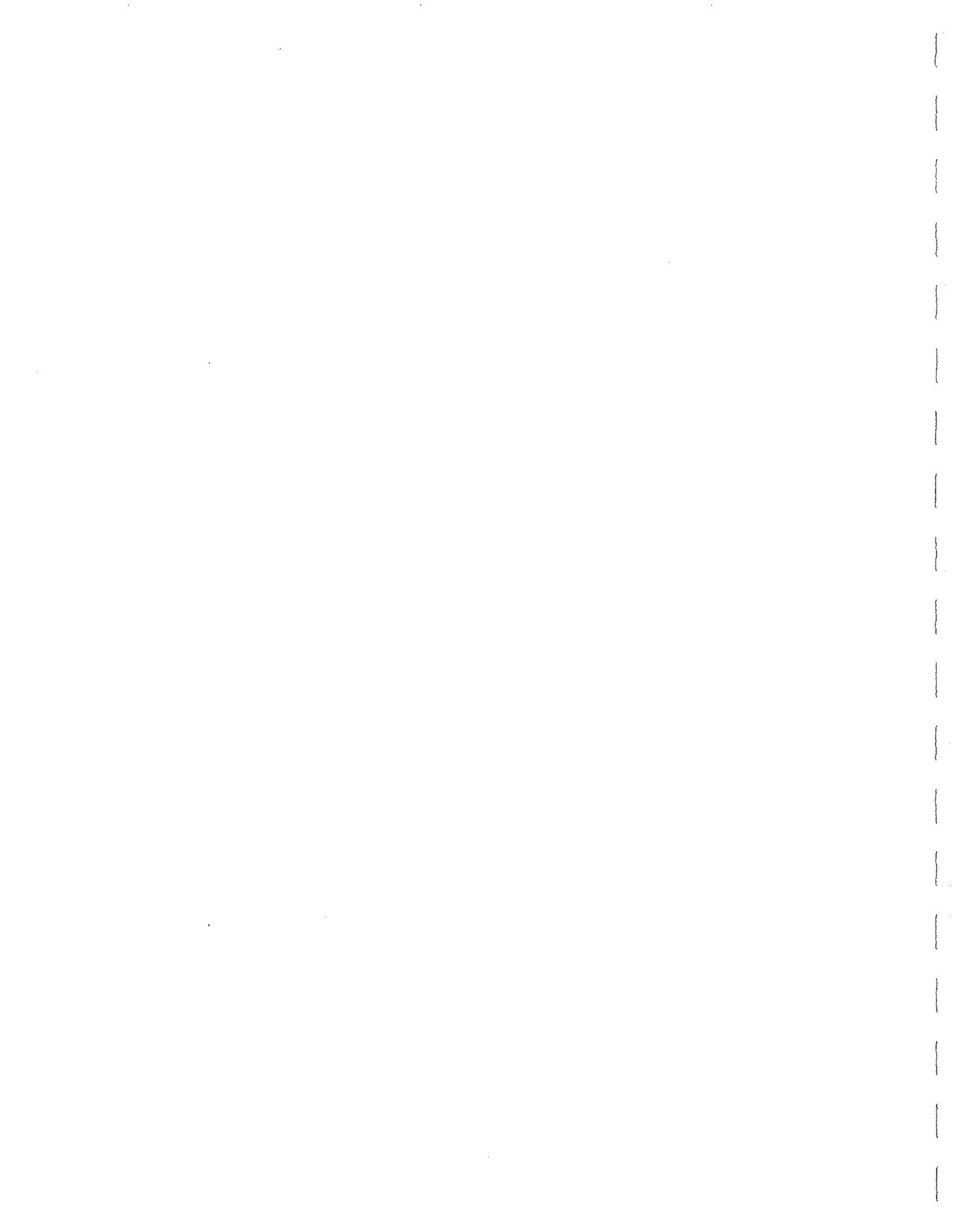
- A. Backfill areas to contours and elevations. Use unfrozen materials.
- B. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, or spongy subgrade surfaces.
- C. Place and compact select fill materials in continuous layers not exceeding 8 inches loose depth.
- D. Place and compact common fill material in continuous layers not exceeding 12 inches loose depth.

- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Remove surplus backfill materials from site.
- G. Leave stockpile areas completely free of excess fill materials.

3.04 BACKFILLING TRENCHES

- A. All trenches shall be backfilled from the bottom of the trench to the centerline of the pipe with Common Backfill or Select Fill Material, Type B or C, placed in layers of three inches and compacted by tamping. Backfilling material shall be deposited in the trench for its full width on each side of the pipe, fittings, and appurtenances simultaneously. The Contractor shall place the backfill around the pipe in such a manner as to confirm there are no void spaces and subsequently compact the fill by flooding if necessary.
- B. From the centerline of the pipe, fittings and appurtenances to a depth of one foot above the top of the pipe, the trench shall be backfilled and compacted in layers. The Contractor shall use special care in placing this portion of the backfill so as to avoid damaging or moving the pipe. Backfill material shall be free from cinders, ashes, refuse, vegetable and organic material, boulders, rocks or stone or other material that in the opinion of the Engineer is unsuitable. From one foot above the top of the pipe to the existing grade, however, material containing stones up to four inches in their greatest dimension may be used, unless otherwise specified.
- C. When the trench crosses a driveway or other access, the Contractor shall backfill the trench immediately to restore access. He shall check all such areas every day to see if any settlement has occurred and if so, shall backfill again to maintain a smooth surface.
- D. All driveways, entrances, and parking areas, consisting of crushed stone, gravel, concrete, or asphaltic surfaces, including those in public rights-of-way, damaged by the construction shall be repaired and replaced with like material to the original grade. All damaged curbs and sidewalks shall also be re-replaced with like material to the original grade. All trench backfilling, replacements and repairs shall be included in the unit price of the pipe unless pay items are provided in the bid schedule.
- E. All areas disturbed by construction shall be restored to at least the original preconstruction conditions, and to the satisfaction of the Engineer.
- F. One year from substantial completion of the project, the Contractor shall return to the site and backfill or smooth out any settlement that has occurred in the entire length of the pipeline. Any areas repaired will be seeded and fertilized.

END OF SECTION



SECTION 02221

TRENCHING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Excavate trenches for utilities as detailed on the plans.
- B. Compacted bed and compacted fill over utilities.
- C. Compaction requirements

1.02 RELATED WORK

- A. Section 02215 - Exvavation
- B. Section 02220 - Backfilling

1.03 PROTECTION

- A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
- B. Underpin adjacent structures which may be damaged by excavation work.
- C. Notify Owner and Engineer's representative, in writing, of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.
- D. Protect bottom of excavations and soil adjacent to and beneath foundation from frost.
- E. Grade excavation top perimeter to prevent surface water run-off into excavation.
- F. Protect from erosion.

PART 2 PRODUCTS

2.01 SELECT BED AND FILL MATERIALS

- A. Type A, B and C - as detailed in Backfilling Section 02220.

2.02 COMMON FILL MATERIALS

- A. Subsoil: Reused; free of gravel larger than 3 inch (75 mm) size, and debris.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify stockpiled fill to be reused is approved.
- B. Verify areas to be backfilled are free of debris, snow, ice, or water, and ground surfaces are not frozen.

3.02 PREPARATION

- A. Identify required lines, levels, contours and datum.
- B. Maintain and protect existing utilities remaining which pass through work area.
- C. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.

3.03 TRENCH EXCAVATION

- A. The trench shall be dug so that the pipe can be laid to the alignment and depth required, and it shall be excavated only so far in advance of pipe laying to prevent unusual lengths of trench standing open over nights and weekends. The width of the trench shall be ample to permit the pipe to be laid and joined properly, and the backfill to be placed and compacted. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing, and handling of valves and fittings.
- B. In the course of excavation, the Contractor may encounter stones or boulders. These large stones or boulders shall be stockpiled and disposed of in an acceptable manner. Boulders and large stones shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe, valves and fittings.
- C. The specified minimum clearances are the minimum clear distances that will be permitted between any part of the pipe and appurtenances being laid and any part, projection or point of such rock, boulder or stone.
- D. Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, refuse, vegetable or other organic material, or large pieces or fragments of inorganic material that in the judgment of the Engineer should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Engineer. This depth shall be 24" below the pipe unless instructed otherwise. Before the pipe is laid, the subgrade shall be relaid with thoroughly compacted suitable material.
- E. The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures or utilities both known and unknown, may be determined and he shall be held responsible for the repair of such structures if broken or otherwise damaged. Whenever it is necessary to excavate to determine the location of existing underground structures, the Contractor shall make exploration and excavation for such purposes.

- F. When rock is encountered and the Contractor determines that blasting will be required, he shall contact the Owner and the Engineer prior to any blasting. A conference will be held to discuss the blasting operation which will include a review of safety and other procedures. All blasting will be conducted in strictest conformance to any and all Municipal, State or Federal laws and regulations covering these operations. If blasting is not conducted in an expert manner at all times, the Engineer reserves the right to suspend blasting and require the work to proceed without it.

3.04 RESTORATION

- A. All disturbed areas shall be restored to at least original preconstruction conditions.

END OF SECTION

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SECTION 02229

ROCK REMOVAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of identified and discovered rock during excavation.
- B. Expansive tools to assist rock removal.

1.02 RELATED SECTIONS

- A. Section 01400 - Quality Control: Inspection of bearing surfaces.
- B. Section 02210 - Site Grading
- C. Section 02215 - Excavating
- D. Section 02220 - Backfilling
- E. Section 02221 - Trenching

1.03 DEFINITIONS

- A. Site Rock: Solid mineral material with a volume in excess of 1/3 cu yd or solid material that cannot be removed with a 3/4 cu yd capacity power shovel.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify site conditions and note subsurface irregularities affecting work of this section.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.

3.03 ROCK REMOVAL BY A MECHANICAL METHOD

- A. Excavate and remove rock by the mechanical method.
- B. Drill holes and utilize expansive tools, wedges or mechanical disintegration compound to fracture rock.
- C. Cut away rock at bottom of excavation to form level bearing.

- D. Remove shaled layers to provide sound and unshattered base for structures.
- E. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- F. Remove excavated materials from site.
- G. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 02220.

3.04 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Assurance: Field inspection.
- B. Provide for visual inspection of foundation bearing surfaces and cavities formed by removed rock.

END OF SECTION

SECTION 02485a

SEEDING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. All disturbed vegetated areas except cultivated cropland shall be seeded.
- B. Preparation of subgrade to receive topsoil when required.
- C. Spreading topsoil.
- D. Seeding and fertilizing.
- E. Seed protection on slopes.
- F. Hydroseeding.
- G. Maintaining seeded areas until acceptance.
- H. Temporary seeding.

1.02 QUALITY ASSURANCE

- A. Supply written analysis stating organic matter content, and pH value of soil.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, seed percentage germination, year of production, net weight, date of packaging and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.04 TEMPORARY SEEDING

- A. Temporary seeding is to be applied to areas during construction to reduce damages from sediment and runoff.

PART 2 PRODUCTS

2.01 GROWING MEDIA

- A. Existing Topsoil: Natural, fertile agricultural soil capable of sustaining vigorous plant growth, not in frozen or muddy condition, containing not less than 6% organic matter, and corrected to pH value of 5.9 to 7.0. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, coughgrass, noxious weeds, and foreign matter.

- B. Fertilizer: 6-24-24 and 48-0-0.
- C. Fertilizer for temporary seeding: 12-12-12.

2.02 SEED

- A. Seed Mixture: 50 percent Kentucky Bluegrass, 40 percent Creeping Red Fescue, and 10 percent Norlea Perennial Rye.
- B. Seed for temporary seeding shall be selected from Table 1.

TABLE 1
TEMPORARY SEEDINGS AND SEEDING DATES

Kind of Seed ¹⁾	Seeding Dates ²⁾	Per 1,000 Sq. Ft.	Per Acre
Oats	March 1- June 15	3 pounds	4 bushel
Oats and Sudangrass	June 16-August 15	2 pounds 2 pounds	2 bushel 2 bushel
Rye or Wheat	August 16-November 1	3 pounds	2 bushel

After November 1, use Mulch only.

- 1) Other seed species may be substituted for the above, check with the local SCS office for recommendations.
- 2) These seeding dates are ideal. With the use of mulch and irrigation, seedings could be made any time from March to September.

2.03 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, reasonably free from weeds, foreign matter detrimental to plant life, and in dry condition. Mulching shall also be applied to temporary seeding.
- B. Mulching Material: Wood or wood cellulose fiber free of growth or germination inhibiting ingredients.

PART 3 EXECUTION

3.01 PREPARATION

- A. Protect existing underground improvements from damage.
- B. Remove foreign materials, plants, roots, stones and debris from site. Do not bury foreign material.
- C. Remove contaminated subsoil.
- D. Cultivate to depth of 3 inches (75 mm), area to receive topsoil. Repeat cultivation areas where equipment has compacted subgrade.

- E. Apply temporary seeding the same day the operations are completed that produce the disturbed area. If no additional work is scheduled for a period of three weeks, seed immediately.

3.02 SPREADING TOPSOIL

- A. Remove from site, foreign materials collected during cultivation.
- B. Grade to eliminate rough spots and low area where ponding may occur. Maintain smooth, uniform grade.
- C. Assure positive drainage away from building.
- D. Finish ground level firm and sufficient to prevent sinkage pockets when irrigation is applied.

3.03 FERTILIZING

- A. Apply fertilizer at a rate of 10 pounds per 1,000 sq. ft.
- B. Do not apply grass seed and fertilizer at same time, in same machine.
- C. Lightly water to aid breakdown of fertilizer and to provide moist soil for seed.

3.04 SEEDING

- A. For final seeding, apply seed at a uniform rate of 5 lbs. per 1,000 sq. ft. Rake in lightly.
- B. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- C. Roll seeded area with roller not exceeding 112 lbs.
- D. Apply water with fine spray immediately after each area has been sown.
- E. Mulch at a rate which will allow a coverage at least 1/2" thick.

3.05 SEED PROTECTION ON SLOPES

- A. Cover seeded slopes where grade is 3:1 or greater with jute matting. Roll matting down over slopes without stretching or pulling. This includes areas that receive temporary seeding.
- B. Lay matting smoothly on soil surface, burying top end of each section in narrow 6 inches trench. Leave 12 inches overlap from top roll over bottom roll. Leave 4 inches overlap over adjacent section.
- C. Staple outside edges and overlaps at 36 inches intervals.

- D. Lightly dress slopes with topsoil to ensure close contact between matting and soil.
- E. In ditches, unroll matting in direction of flow. Overlap ends of strips 6 inches (150 mm) with upstream section on top.

3.06 MAINTENANCE PERIOD

- A. Maintenance Period: Until final acceptance.

3.07 MAINTENANCE

- A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion.
- B. Water to ensure uniform seed germination and to keep surface of soil damp.
- C. Apply water slowly so that surface of soil will not puddle and crust.
- D. After first mowing, water grass sufficient to moisten soil from 3 inches to 5 inches deep.
- E. Apply weed killer when weeds start developing, during calm weather when air temperature is above 50 degrees F.
- F. Replant damaged grass areas showing root growth failure, deterioration, bar or thin spots, and eroded areas.
- G. Irrigation: If soil moisture is deficient, supply new seedings with adequate water for plant growth until they are firmly established. This is especially true when seeding is done late in planting season, in abnormally dry or hot season, or on adverse sites.

3.08 RESTORATION

- A. Restore pavement, concrete, grassed areas, planted areas damaged during execution of work, of this section.

3.09 ACCEPTANCE

- A. Seeded areas will be accepted at end of maintenance period when seeded areas are properly established and otherwise acceptable.

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fence framework, fabric, and accessories.
- B. Excavation for post bases; concrete foundation for posts, and center drop for gates.
- C. Manual gates and related hardware.

1.02 REFERENCES

- A. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
- B. ASTM A121 - Zinc-Coated (Galvanized) Steel Barbed Wire.
- C. ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric.
- F. ASTM A428 - Weight of Coating on Aluminum-Coated Iron or Steel Articles.
- G. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- H. ASTM A491 - Aluminum-Coated Steel Chain Link Fence Fabric.
- I. ASTM A569 - Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- J. ASTM A585 - Aluminum Coated Steel Barbed Wire.
- K. ASTM C94 - Ready-mixed Concrete.
- L. ASTM F567 - Installation of Chain-Link Fence.
- M. ASTM F573 - Residential Zinc-Coated Steel Chain Link Fence Fabric.
- N. ASTM F668 - Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.
- O. ASTM F669 - Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.
- P. ASTM F1083 - Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

Q. ASTM F1234 - Protective Coatings on Steel Framework for Fences.

R. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual.

1.03 SYSTEM DESCRIPTION

A. Fence Height: As indicated on Drawings.

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

1.04 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

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

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

1.05 QUALIFICATIONS

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

PART 2 PRODUCTS

2.01 MATERIALS

A. Framing (Steel): ASTM F1083 Schedule 40 galvanized steel pipe, welded construction, coating conforming to ASTM F1234 Type A on pipe exterior and interior.

B. Fabric Wire (Steel): ASTM A116 galvanized wire.

C. Barbed Wire: ASTM A121 galvanized steel 12 gage thick wire, 3 strands, 4 points at 3 inch oc.

D. Concrete: Type specified in Section 03300.

2.03 COMPONENTS

A. Line Posts: 2.38 inch diameter.

B. Corner and Terminal Posts: 2.88 inch.

C. Gate Posts: 4.0 inch diameter.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.66 inch diameter for welded fabrication.

- F. Fabric: 2 inch diamond mesh interwoven wire, 9 gage thick, top selvage twisted tight, bottom selvage twisted tight.
- G. Tension Wire: 6 gage thick steel, single strand.
- H. Tie Wire: Aluminum alloy steel wire.

2.04 ACCESSORIES

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.
- C. Extension Arms: Cast steel galvanized to accommodate 3 strands of barbed wire, single arm, sloped to 45 degrees.
- D. Gate Hardware: Fork latch with gravity drop; two 180 degree gate hinges per leaf and hardware for padlock.

2.05 FINISHES

- A. Components and Fabric: Galvanized to ASTM A123; 1.8 oz/sq ft coating.
- B. Hardware: Galvanized to ASTM A153, 1.8 oz/sq ft coating.
- C. Accessories: Same finish as framing.

PART 3 EXECUTION

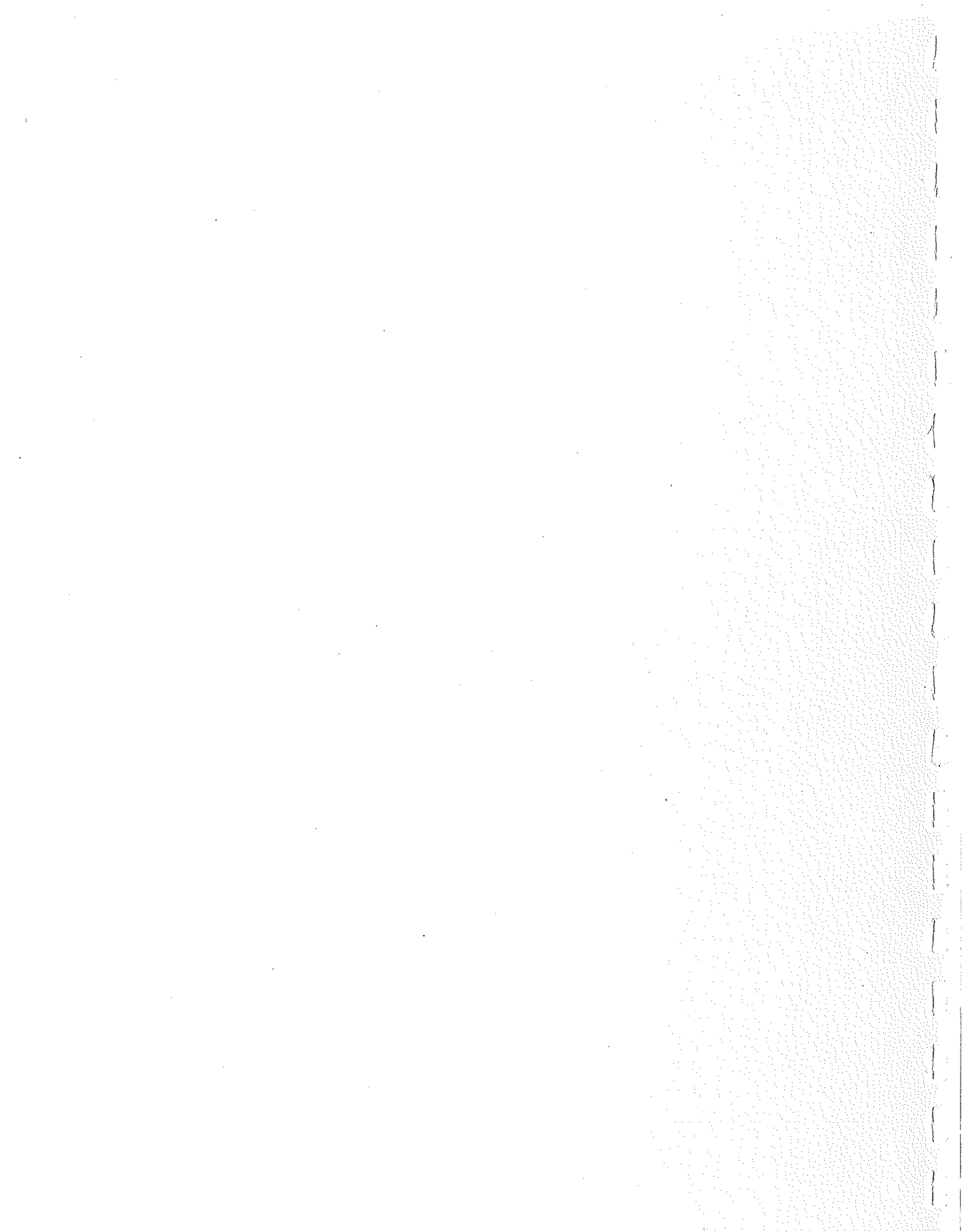
3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with manufacturer's instructions.
- B. Place fabric on outside of posts and rails.
- C. Set intermediate, terminal, and gate posts plumb, in concrete footings with top of footing 2 inches below finish grade. Slope top of concrete for water runoff.
- D. Line Post Footing Depth Below Finish Grade: ASTM F567 or as shown on plans.
- E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567 or as shown on plans.
- F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

- H. Install center and bottom brace rail on corner gate leaves.
 - I. Do not stretch fabric until concrete foundation has cured 7 days.
 - J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
 - K. Position bottom of fabric 2 inches above finished grade.
 - L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
 - M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
 - N. Install bottom tension wire stretched taut between terminal posts.
 - O. Install support arms sloped inward and attach barbed wire; tension and secure.
 - P. Do not attach the hinged side of gate from building wall; provide gate posts.
 - Q. Install gate with fabric and barbed wire overhang to match fence. Install three hinges per leaf, latch, catches, drop bolt.
 - R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- 3.02 ERECTION TOLERANCES
- A. Maximum Variation From Plumb: 1/4 inch.
 - B. Maximum Offset From True Position: 1 inch.
 - C. Components shall not infringe adjacent property lines.

END OF SECTION

DIVISION 3 – CONCRETE



2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

CONSTRUCTION SPECIFICATIONS

** INDEX **

SECTION

DIVISION 3 - CONCRETE

03100	Concrete Formwork
03200	Concrete Reinforcement
03300	Cast-In-Place Concrete
03370	Concrete Curing

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 03300 - Cast-In-Place Concrete: Supply of concrete accessories for placement by this section.

1.03 RELATED SECTIONS

- A. Section 02215 - Excavation: Shoring and underpinning.
- B. Section 03200 - Concrete Reinforcement.
- C. Section 03300 - Cast-in-Place Concrete.
- D. Section 03370 - Concrete Curing

1.04 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 347 - Recommended Practice For Concrete Formwork.
- D. ANSI/ASME A17.1 - Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks
- E. PS 1 - Construction and Industrial Plywood.

1.05 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.

- B. Maintain one copy of each document on site.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for design, fabrication, erection and removal of formwork.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01610 and 01620.
- B. Deliver void forms and installation instructions in manufacturer's packaging.
- C. Store off ground in ventilated and protected manner to prevent deterioration from moisture and/or soil.

1.09 COORDINATION

- A. Coordinate this Section with other Sections of work which require attachment of components to formwork.
- B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

- A. Plywood: Douglas Fir or spruce species; solid one side, select sheathing, tight face, medium density overlaid one side grade; sound undamaged sheets with clean, true edges.
- B. Lumber: #2 grade; with grade stamp clearly visible.

2.02 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage (1.5 mm), matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Pan Type: Steel or Glass fiber of size and profile required.
- D. Tubular Column Type: Round, spirally wound laminated fiber or glass fiber material, surface treated with release agent, non-reusable, of sizes required.

- E. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches (50 mm) thick.

2.03 FORMWORK ACCESSORIES

- A. Form Ties: Removable or snap-off type, galvanized metal, adjustable length, free of defects that could leave holes larger than 1 inch (25 mm) in concrete surface.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding, or color characteristics of coating intended for use on concrete.
- C. Corners: Chamfer wood strip type; 1" x 1" (25 x 25 mm) size; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage (0.8 mm) thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Flashing Reglets: Galvanized steel, 22 gage (0.8 mm) thick, longest possible lengths, with alignment splines for joints, non-filled, release tape sealed slots, anchors for securing to concrete formwork.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- G. Waterstops: Polyvinyl chloride, minimum 1,800 psi (12 MPa) tensile strength, minimum 50 degrees F (46 degrees C) to plus 175 degrees F (79 degrees C) working temperature range, width as shown on plans, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. Earth forms are not permitted.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.

- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide fillet and chamfer strips on external corners of beams, joists and columns.
- G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops continuous without displacing reinforcement. Heat seal joints watertight.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.
- B. Camber slabs and beams in accordance with ACI 301.

3.08 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.02 RELATED SECTIONS

- A. Section 03100 - Concrete Formwork.
- B. Section 03300 - Cast-in-Place Concrete.

1.03 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements For Reinforced Concrete.
- C. ACI SP-66 - American Concrete Institute - Detailing Manual.
- D. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- E. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- F. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- G. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement.
- H. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- I. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- J. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- K. ASTM A616 - Rail Steel Deformed and Plain Bars for Concrete Reinforcement.
- L. ASTM A767 - Zinc-Coated (Galvanized) Bars for Concrete Reinforcement.
- M. ASTM A775 - Epoxy-Coated Reinforcing Steel Bars.
- N. ASTM D3963 - Epoxy-Coated Reinforcing Steel.
- O. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

- P. CRSI - Concrete Reinforcing Steel Institute - Manual of Practice.
- Q. CRSI - Placing Reinforcing Bars.
- R. ASTM A884 - Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01340.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.
- C. Manufacturer's Certificate: Certify that materials meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI - Manual of Standard Practice, ACI 301.
- B. Maintain one (1) copy of each document on site.
- C. Submit certified copies of mill test report of reinforcement materials analysis.

1.06 QUALIFICATIONS

- A. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Kentucky.
- B. Welders' Certificates: Submit under provisions of Section 01400 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.07 COORDINATION

- A. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi (414) MPa yield grade; deformed billet steel bars.
- B. Reinforcing Steel Plain Bar and Rod Mats: ASTM A704, ASTM A615, Grade 40 steel bars or rods, unfinished.
- C. Stirrup Steel: ANSI/ASTM A82.
- D. Welded Steel Wire Fabric: ASTM A497 Deformed Type.

2.02 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 318, ANSI/ASTM A184.
- B. Epoxy Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI.
- C. Locate reinforcing splices not indicated on drawings, at point of minimum stress.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as follows:

<u>Item</u>	<u>Coverage</u>
Beams	3 inch
Supported Slabs and Joists	2 inch
Column Ties	3 inch
Walls (exposed to weather or backfill)	2 inch
Slabs on Fill	3 inch

- E. Bond and ground all reinforcement to requirements of Section 16450.

3.02 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cast-in-place concrete for structures.
- B. Floors and slabs on grade.
- C. Control, expansion and contraction joint devices, waterstops, and joint sealants.
- D. Equipment pads, light pole base, thrust blocks and manholes.

1.02 RELATED WORK

- A. All associated sections and trades relating to the placement of concrete as shown on the drawings.

1.03 REFERENCES AND QUALITY ASSURANCE

- A. ACI 211.1 - Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- B. ACI 211.2 - Selecting Proportions for Structural Lightweight Concrete.
- C. ACI 301 - Structural Concrete for Buildings.
- D. ACI 302 - Guide for Concrete Floor and Slab Construction.
- E. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- F. ACI 305R - Hot Weather Concreting.
- G. ACI 306R - Cold Weather Concreting.
- H. ACI 308 - Standard Practice for Curing Concrete.
- I. ACI 318 - Building Code Requirements for Reinforced Concrete
- J. ASTM C33 - Concrete Aggregates.
- K. ASTM C94 - Ready-Mixed Concrete.
- L. ASTM C150 - Portland Cement.
- M. ASTM C260 - Air Entraining Admixtures for Concrete.
- N. ASTM C330 - Light Weight Aggregates for Structural Concrete.

- O. ASTM C494 - Chemical Admixtures for Concrete.
 - P. ASTM C948 - Test Method for Dry and Wet Bulk Density, Water Absorption and apparent Porosity of Thin Sections of Glass-Fiber-Reinforced Concrete.
 - Q. ASTM C994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - R. ASTM D11751 - Asphalt Impregnated Fiberboard Joint Fillers for Concrete Paving and Structural Construction.
 - S. FS TT-S-230 - Sealing Compounds, Synthetic-Rubber Base, Single Component, Chemically Curing.
 - T. SS-S-210A - Sealing Compound for Preformed Plastic Waterstop.
- 1.04 SUBMITTALS FOR REVIEW
- A. Section 01340 - Shop Drawings, Product Data and Samples.
 - B. Product Data: Provide data on joint devices, attachment accessories and control joints.
- 1.05 TESTS
- A. Submit proposed mix design for each class of concrete to the Owner for review prior to commencement of work.
 - B. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.
 - C. Four concrete test cylinders will be taken for every 50 or less cubic yards of concrete placed each day.
 - D. One additional test cylinder will be taken during cold weather and cured on site under the same conditions as concrete it represents.
 - E. Additional cylinders may be required by the Owner if they have reason to believe there is a potential problem.
 - F. 28-Day Compressive Strength Test. Concrete tests shall be conducted according to ACI 301.
 - G. One slump test shall be taken for each truckload of concrete.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150, Normal, Type A.
- B. Fine and Coarse Aggregates: ASTM C33 - Coarse aggregate shall be .75 - 1.00 maximum.

- C. Water: Clean and not detrimental to concrete.

2.02 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical Admixture: ASTM C494.

2.03 ACCESSORIES

- A. Vapor Barrier: 6 mil thick clear polyethylene film, type when recommended, as shown on drawings.
- B. Joint Filler: Type A ASTM C1751 - Asphalt impregnated fiberboard or felt 1/4" thick tongue and groove profile, when recommended, as shown on drawings.
- C. Preformed Plastic Waterstop: Single-component, self-sealing plastic waterstop, "Synko - Flex Products, Inc.", "AMICO", "Greenstreak", or approved equal, as shown on drawings.
- D. Sealant: Silicone base, single component, solvent curing capable of withstanding movement of up to 25% of joint width and satisfactorily applied throughout a temperature range of 40 to 80 degrees F, when recommended, as shown on drawings.

2.04 CONCRETE MIX(ES)

- A. Mix concrete in accordance with ASTM C94.
- B. Provide concrete for structures with the minimum following characteristics: 28 days - 4,000 psi, air content - $6 \pm 1\%$, slump - 4 in. maximum.
- C. Use accelerating admixtures in cold weather only when accepted by the Engineer. Use of admixtures will not relax cold weather placement requirements.
- D. use set-retarding admixtures during hot weather only when approved by Engineer.
- E. Add air entraining agent to concrete mix for concrete work exposed to exterior and to concrete mix for tanks.

2.05 STORAGE OF MATERIAL

- A. Cement and aggregates shall be stored so as to prevent deterioration or intrusion of foreign matter. Liquid admixtures shall be protected from freezing and from settling out of solution. No deteriorated or damaged material shall be used for concrete.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely and will not cause hardship in placing concrete.

3.02 MIXING AND PLACING CONCRETE

- A. Notify Engineer minimum 24 hours prior to commencement of concreting operations.
- B. Place concrete in accordance with ACI 301.
- C. Hot weather placement: ACI 305R.
- D. Cold weather placement: ACI 306R.
- E. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- F. Maintain concrete cover around reinforcing as follows:

<u>Item</u>	<u>Cover</u>
Walls (exposed to weather or backfill)	2 inches
Footings and concrete formed against earth	3 inches
Slabs on fill	3 inches

- G. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. Preparation of Equipment and Place of Deposit:
1. Before placement, all equipment for mixing and transporting the concrete shall be cleaned, and all debris and ice shall be removed from the places to be occupied by the concrete. Forms shall be thoroughly wetted (except in freezing weather) or oiled, and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather). The reinforcement shall be thoroughly cleaned of ice, dirt, loose rust and mill scale, or other coatings.
 2. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. All laitance and other unsound material shall be removed from hardened concrete before additional concrete is added.

I. Mixing:

1. Ready mixed concrete shall be mixed and delivered in accordance with Specifications for Ready-Mixed Concrete (ASTM C94); CSA A23.1, Clauses 12 and 13.

2. For job-mixed concrete, the mixer shall be rotated at a speed recommended by manufacturer. If mixer performance tests are not made, each batch of 1 cu. yd. or less shall be mixed for at least 1 minute after all materials are in the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. The entire batch shall be discharged before the mixer is recharged.

J. Conveying:

1. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation or loss of materials.
2. Equipment for cutting, pumping and pneumatically conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery and without separation of materials.

K. Placing:

1. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall be placed at such a rate that it is at all times plastic and flows readily between bars. No concrete contaminated by foreign material shall be used, nor shall retempered concrete be used unless approved by the Engineer.
2. When placing is started, it shall be carried on as a continuous operation until placement of the panel or section is completed.
3. All concrete shall be thoroughly consolidated during placement. It shall be thoroughly worked around reinforcement and embedded fixtures and into the corners of the forms.
4. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify the Engineer upon discovery.

L. Curing:

1. Concrete shall be kept moist for at least 7 days after placement.

3.03 FINISHING

- A. Provide concrete surfaces to be left exposed with smooth rubbed finish.
- B. Provide Class C tolerances to floor slabs and toppings according to ACI 301.

3.04 PATCHING

- A. Notify the Engineer immediately upon removal of forms.

B. Patch imperfections.

3.05 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required levels and lines, details, and elevations.

B. Repair or replace concrete not properly placed or of the specified type.

3.06 FIELD QUALITY CONTROL

A. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.07 PROTECTION

A. Concrete shall be kept continually moist throughout the curing process.

END OF SECTION

SECTION 03370
CONCRETE CURING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Initial and final curing of horizontal and vertical concrete surfaces.

1.02 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete.

1.03 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Recommended Practice for Concrete Floor and Slab Construction.
- C. ACI 308 - Standard Practice for Curing Concrete.
- D. ASTM C171 - Sheet Materials for Curing Concrete.
- E. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- F. ASTM D2103 - Polyethylene Film and Sheeting.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01340.
- B. Product Data: Provide data on curing compounds, mats, film, compatibilities, and limitations.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301 and ACI 302.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products under provisions of Section 01610 and 01620.
- B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Membrane Curing Compound Type 1: ASTM C309 Type 1 Class A styrene-acrylate without fugitive dye.

- B. Water: Potable, not detrimental to concrete.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify substrate conditions.
- B. Verify that substrate surfaces are ready to be cured.

3.02 EXECUTION - HORIZONTAL SURFACES

- A. Cure floor surfaces in accordance with ACI 308.
- B. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

***** [OR] *****

- B. Polyethylene Film: Spread over floor slab areas, lap edges and sides, seal with pressure sensitive tape; maintain in place for 7 days.

3.03 EXECUTION - VERTICAL SURFACES

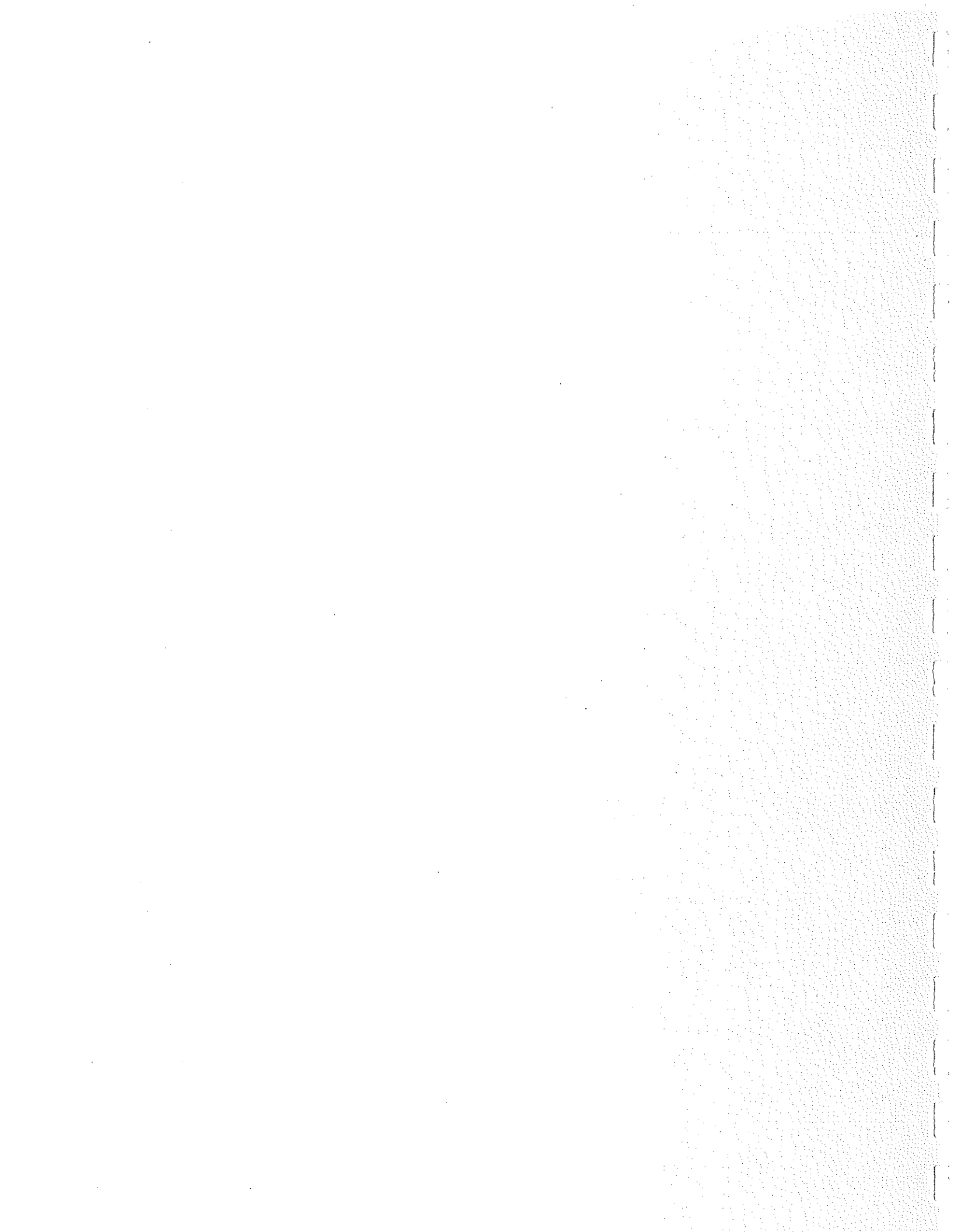
- A. Cure surfaces in accordance with ACI 308.
- B. Spraying: Spray water over surfaces and maintain wet for 7 days.

3.04 PROTECTION OF FINISHED WORK

- A. Protect finished Work.
- B. Do not permit traffic over unprotected floor surface.

END OF SECTION

DIVISION 9 – FINISHES



2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

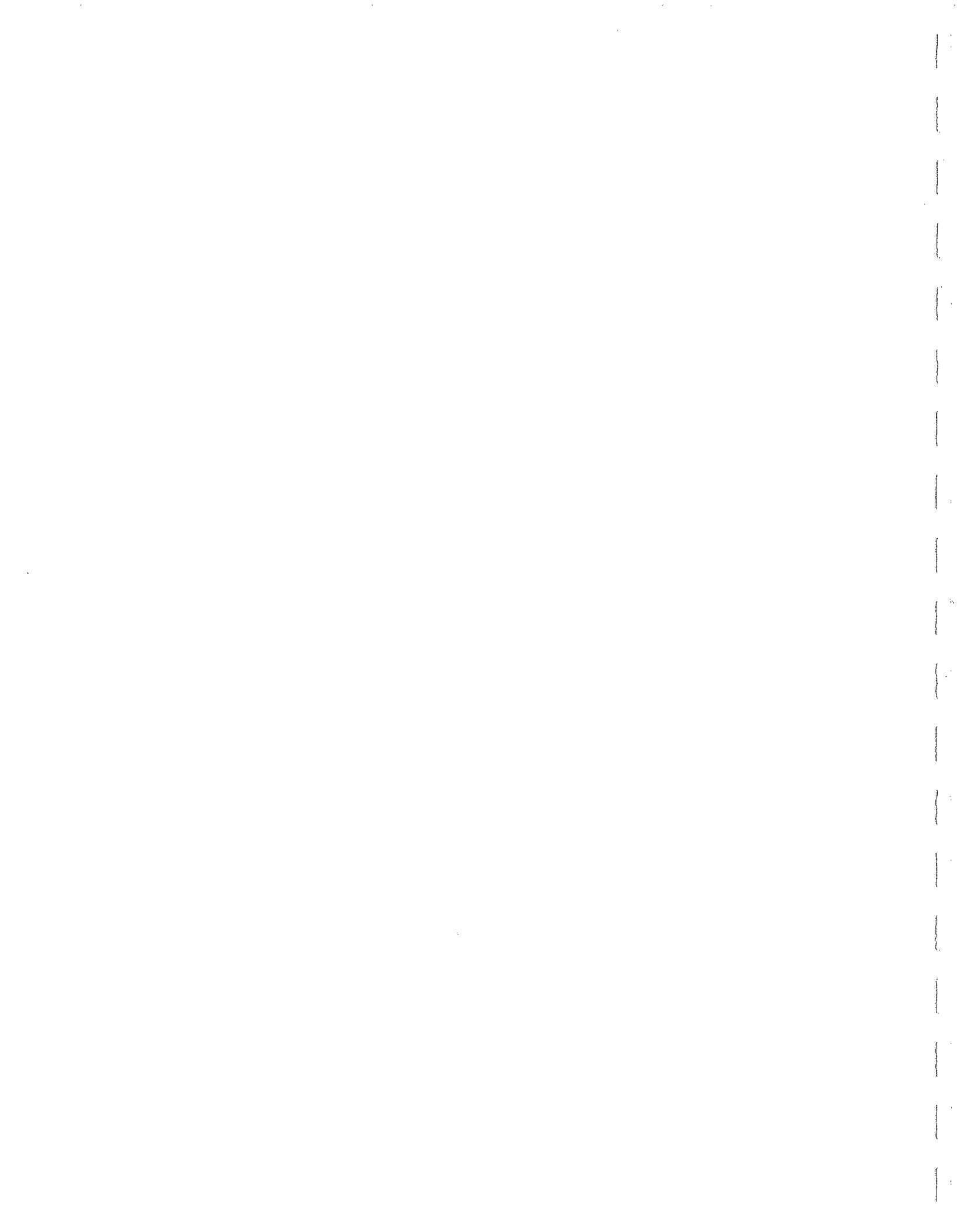
CONSTRUCTION SPECIFICATIONS

** INDEX **

SECTION

DIVISION 9 - FINISHES

09901 Painting Water Storage Tanks



SECTION 09901

PAINTING
WATER STORAGE TANKS

PART 1 GENERAL

1.01 WORK INCLUDES

- A. Prepare surfaces which are to receive finish.
- B. Finish surfaces as indicated in this section.

1.02 RELATED SECTIONS

- A. Provide shop drawings in accordance with Section 01300.
- B. The paint supplier shall submit a certification stating that the paint system to be used is acceptable for use on a portable water storage tank.

1.03 REFERENCE STANDARDS

- A. American Water Works Association (AWWA).
- B. Surface Preparation Specification (SSPC).

1.04 SAMPLES

- A. Colors to be selected by Owner prior to commencement of work.

1.05 MAINTENANCE MANUALS

- A. Leave on premises, where directed by Architect/Engineer prior to commencement of work.
- B. Containers to be tightly sealed and clearly labeled for identification.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation and instructions for mixing and/or reducing.
- B. Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 45 degrees F and maximum 100 degrees F in well ventilated area.
- C. Take precautionary measures to prevent fire hazards and spontaneous combustions.

1.07 ENVIRONMENTAL CONDITIONS

- A. Paint shall not be applied to wet or damp surfaces and shall not be applied in the rain, snow, fog or mist or when the relative humidity is in excess of 85%.
- B. Ensure surface temperatures or the surrounding air temperature is above 60 degrees F before applying paint. No paint shall be applied when it is expected that the ambient temperature will drop below 60 degrees F within 6 hours after the application of the paint. Dew or moisture condensation should be anticipated, and in such conditions are prevalent, painting shall be delayed until midmorning to be certain that the surfaces are dry. Further, the day's painting shall be completed well in advance of the probable time of day when condensation will occur, in order to permit the film an appreciable drying time prior to the formation of moisture.

1.08 GUARANTEE

- A. The Contractor shall furnish a guarantee on the tank painting period of one (1) year from the date of substantial completion stating that he will repair any defects due to faulty workmanship or materials which may appear during that period.

The tank(s) will be drained and inspected before the one (1) year expires and the Contractor will be notified of any detectable paint failures.

PART 2 PRODUCTS

2.01 GENERAL OBJECTIVE

- A. The paint and paint products of TNEMEC Company, North Kansas City, Missouri, mentioned in the following specifications are set up as standards of quality. The usual "as equal" clause shall apply. The products of other manufacturers comparable in quality and type of those specified will be acceptable if data on past performance on water storage tanks, composition, directions for use, and other information required, is presented to and approved by the Engineer. No request for substitution shall be considered unless received, in writing, within fifteen (15) days following the date of Notice to Proceed.

PART 3 EXECUTION

3.01 GENERAL OBJECTIVE

- A. The object of these specifications is to provide the material and workmanship necessary to produce a first-class job.

Painting shall be done at such times as approved by the Engineer. All painting shall be done strictly in accordance with the manufacturer's instructions and shall be performed in a manner satisfactory to the Engineer.

3.02 SURFACE PREPARATION

- A. Prior to priming in the shop, all surfaces shall be cleaned of all rust, mil scale, rust, as well as other interference materials. For interior wet area surfaces, the removal of these items shall be accomplished by sandblasting in accordance with SSPC Surface Preparation Specification No. 10 or pickling in accordance with SSPC Preparation Specification No. 8. Exterior surfaces and interior dry areas shall be sandblasted in accordance with SSPC Surface Preparation Specification No. 6 or pickling in accordance with SSPC Surface Preparation Specification No. 8. In the field, following erection and welding, the weld which the shop paint has been damaged shall be sandblasted in accordance with SSPC Surface Specification No. 10. All surfaces so cleaned shall be painted the same day that the cleaning operation is carried out, and the Architect/Engineer shall be given 48 hour notice after all surfaces have been cleaned and primed "prior" to painting, in order to inspect the tank welds and cleanness.

3.03 APPLICATION OF PAINT

- A. The painter shall apply each coating at the rate and in the manner specified by the manufacturer. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of additional coat(s) of paint.

3.04 INTERIOR PAINTING SYSTEM (WET AREAS)

- A. In the shop, all interior surfaces shall receive one coat of TNEMEC Series 91-H₂O Hydro-Zinc 2000 to a dry film thickness of 2.5 - 3.5 mils.
- B. In the field, following erection, welding and necessary surface preparation, all welds and other areas which have been cleaned down to bare metal shall receive one coat of TNEMEC Series 91-H₂O Hydro-Zinc 2000 to a dry film thickness of 2.5 - 3.5 mils.
- C. The finish coats shall consist of two (2) coats of two component, high build epoxy similar to TNEMEC Series N140-1255 intermediate and N140-WHO2 top coat, with a dry film thickness of 4.0 to 6.0 mils per coat.
- D. The total dry film thickness shall be 10.5 - 15.5 mils.
- E. Coating shall have NSF approval.

3.05 INTERIOR PAINTING SYSTEM (DRY AREA)

- A. In the shop, all interior surfaces shall receive one coat of TNEMEC Series N140-1255 High Build Epoxy to a dry film thickness of 3.0 to 5.0 mils.

- B. In the field, following erection, welding and necessary surface preparation, all welds and other areas which have been cleaned down to bare metal shall receive one coat of TNEMEC Series N140-1255 High Build Epoxy to a dry film thickness of 3.0 to 5.0 mils.
- C. The finish coat shall consists of one (1) coat of TNEMEC Series N140 WHO2 Potapox White (Epoxy) to a dry film thickness of 4.0 to 6.0 mils.
- D. The total dry film thickness shall be 7.0 - 11.0 mils.

3.06 EXTERIOR PAINTING SYSTEM

- A. In the shop, all exterior surfaces shall receive one coat of TNEMEC Series 91-H₂O Hydro-Zinc 2000 to a dry film thickness of 2.5 to 3.5 mils.
- B. In the field, following erection, welding and necessary surface preparation, all welds and other areas which have been cleaned down to bare metal shall receive one coat of TNEMEC Series 91-H₂O Hydro-Zinc 2000 applied to a dry film thickness of 2.5 to 3.5 mils.
- C. An intermediate coat shall consist of one (1) coat of Tnemec Series 66 two component, high build epoxy, same as finish color, to a dry film thickness of 2.5 to 3.5 mils.
- D. The finish coat shall consist of TNEMEC Series 74, gloss, color, (Polyurethane Enamel) to a dry film thickness of 2.0 to 3.0 mils.
- E. The total dry film thickness shall be 7.0 to 10.0 mils.
- F. All portions of any tank, reservoir, standpipe, etc., that will be below finished grade after completion of installation, and all surfaces of any steel inlet pipe, shall be painted in accordance with Interior Painting System.

3.07 TEST

- A. After the final coat has been applied and allowed to cure for a minimum of seven (7) days, the Engineer will check the paint thickness and check paint appearance. Deficiencies in paint thickness will be corrected by applying additional finish coats, at the expense of the Contractor.
- B. The finish coating on all surfaces shall be completely without defects permitting moisture penetration when testing according to the low-voltage, wet-sponge method. Deficiencies in the continuity of the coating shall be corrected by applying additional finish coats, at the expense of the Contractor.

3.08 VENTILATION AND DRYING TIME

- A. Adequate ventilation which will effectively remove solvents shall be provided for proper drying of paints on interior tank surfaces. A minimum of seven (7) days following the application of the final

coat on the interior surfaces shall be allowed before the tank is sterilized or filled with water.

3.09 LETTERING

- A. The Contractor shall include in his bid price the cost for painting the name of the Water Company on the tank at two (2) locations. Shop drawings for A/E approval shall be submitted indicating the height, width, spacing, and width of the stripes for the lettering. Height of letters shall not be less than six (6) feet for the Kentucky Highway 146 Tank.

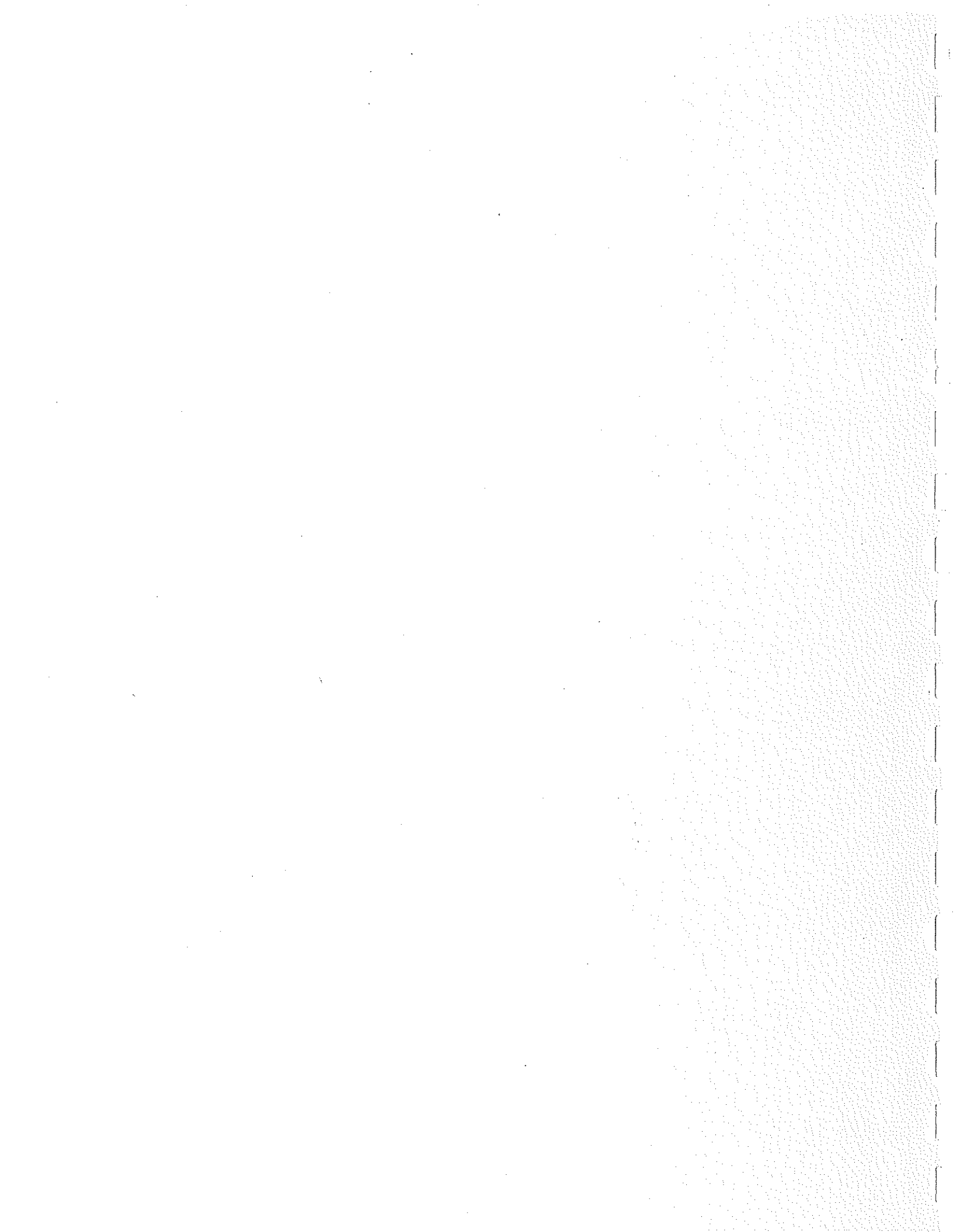
3.10 CLEANUP

- A. Upon completion of all work, the coating applicator shall remove all surplus materials and rubbish. He shall repair all damage caused by his workers and shall leave the premises in a clean and orderly condition.

END OF SECTION



DIVISION 13 – SPECIAL CONSTRUCTION



2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

CONSTRUCTION SPECIFICATIONS

** INDEX **

SECTION

DIVISION 13 - SPECIAL CONSTRUCTION

13300 Water Distribution System



SECTION 13300

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDED

- A. Under this section of the specifications all water distribution piping and appurtenances shall be furnished and installed.
- B. The work covered by this section of the specifications shall include, in general, installation of all distribution piping, fittings, valves, valve vaults, O & M hydrants, connections to existing mains, pressure testing, disinfection and etc.

1.02 RELATED SECTIONS

- A. All applicable sections of these specifications and the plans.

1.03 QUALITY ASSURANCE

- A. Products/materials - AWWA Standards.
- B. Installation - AWWA Standards.
- C. All products, devices, materials, and accessories shall be new and never before used. They shall be clean and/or restored to like new condition prior to approval of submittal by the Engineer.
- D. The front end of each load of pipe shall be completely tarped to prevent fumes from entering pipe.

PART 2 PRODUCTS

2.01 DUCTILE IRON (DI) PIPE

- A. Ductile iron pipe shall conform in all respects to ANSI A21.51 (AWWA C-151) and ANSI A21.50 (AWWA C-150) latest revisions, except as modified herein. D.I. pipe shall be minimum Class 350 for 4" thru 12", Class 250 for 14" thru 20", Class 200 for all larger sizes unless indicated otherwise on the plans and/or in the Bid Schedule. All interior surfaces of the pipe and fittings shall have a factory applied bituminous coated cement mortar lining per ANSI A-21-4; except the cement lining shall be double thickness. The standard coating for buried piping and fitting shall be a bituminous coating and shall conform to ANSI Specification A21-10 (AWWA C-110), Section 10-8 and ANSI Specification A21.51 (AWWA C-151).
- B. Five percent of the pipe furnished shall be manufactured and inspected so as to insure that whenever a cut is made at any point along the pipe barrel, the cut end will socket properly into a push-on joint bell. This pipe shall be identified by a painted green strip along the length of the pipe barrel.

- C. Ductile iron non-restrained joint pipe shall be of the push-on joint type meeting the requirements of AWWA C-151/ANSI A21.51 and AWWA C-111/ANSI A21.11. The pipe shall be "Tyton Joint" pipe - U.S. Pipe and Foundry, "Super Bell Tite" - Clow Corporation or "American Fastite Joint" pipe - American Cast Iron Pipe Company or equal.
- D. Push-on type joints shall have an annular recess in the pipe socket to accommodate a single rubber gasket. Plain ends shall be suitably beveled to permit easy entry into the bell. The gasket and annular recess of the socket shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled.
- E. Mechanical joints shall be bolted and of the stuffing box type and shall consist of a bell, with exterior flange and interior recess for the sealing gasket, a pipe or fitting plain end, a sealing gasket, a follower gland, tee-head bolts and hexagon nuts.
- F. Restrained joints shall be of the flexible, positive locking type. The thickness of the pipe barrel remaining at grooves cut for restraint shall not be less than the nominal wall thickness of the class specified. Follower glands held in place with set screws will not be acceptable.
- G. Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced, the letters "DI" or words "DUCTILE" and the standard thickness class designation.

2.02 D.I. FITTINGS AND ACCESSORIES

- A. Ductile iron fittings shall conform to ANSI Specification A21.53 (AWWA C153). All lining and coating for fittings shall be as specified for pipe. The fittings shall be designed to withstand the same pressures as required for the adjoining pipe and shall have the same type of joints.
- B. Fittings shall be coated outside with a standard bituminous material equal to that specified for ductile-iron pipe under ASA Specification A21.51 (AWWA C 151) or with 6-8 mil nominal thickness fusion bonded epoxy conforming to the requirements of ANSI/AWWA C-550 and C116/A21-16.
- C. Fittings shall be as manufactured by U.S. Pipe and Foundry Co., American Cast Iron Pipe Co., Clow Corp., or Engineer approved equal.
- D. Push-on (slip) joint fittings shall conform to ANSI 21.11 (AWWA C 111).
- E. Mechanical joint fittings including accessories shall conform to ANSI 21.11 (AWWA C 111).
- F. Flanged joint fittings shall conform to ANSI A21.10 (AWWA C 110) or ANSI B16.1.
- G. All flanged joints shall be furnished with 1/8 inch thick red rubber gaskets. The bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in American

Standard for Wrench Head Bolts and Nuts and Wrench Openings (ANSI B18.2). Material for bolts and nuts shall conform to ASTM A-307 Grade B.

- H. Restrained joints shall be provided for all joints of fitting and pipe in road or railroad bores.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPE

- A. All pipe shall be installed in accordance with the manufacturer's published instructions, modified only as may be directed herein or by the Engineer. All piping locations shall be as shown on the plans and staked out prior to installation. The Contractor and Resident Inspector shall agree on the staked location of the water main prior to installation. No installation shall be made without documentation of easement or permit. Construction outside of easement or permit area shall be at the Contractor's expense.

All pipe installations shall comply with applicable paragraphs contained as part of these construction specifications.

- B. Pipe Bury Depth - normal laying depth shall be 36" of cover depth minimum regardless of pipe diameter. Where rock is encountered, the minimum cover over top of the pipe shall be 30". Where rock is excavated, 5 inches of sand bedding shall be required. Where rock is encountered on the trench bottom at the normal laying depth, 5 inches of sand bedding shall be required.
- C. All piping shall be assembled in accordance with the layout shown on the plans with only such modifications as may be necessary to conform to the final detail dimensions or location of existing water mains, hydrants, existing utilities, tanks, valve vaults, booster stations, valves, county roads, highway and stream crossings, etc. In crossing under ditches and streams the standard depth of trench required under the Construction Specifications for the job shall be maintained. Standard fittings shall be used if required to depress the pipe but in no case shall the approach to the crossing be laid at a steeper angle than forty-five degrees (45°) with the horizontal.
- D. All pipe installed under this contract shall be installed in accordance with the applicable sections of AWWA Specification C 600. Class B laying conditions shall be maintained. Trench width at the top of the pipe shall not exceed the pipe diameter plus 1-1/2 feet unless approved by the Engineer.
- E. If, in the course of construction, ground water is encountered, the Contractor shall, by means of well points or other acceptable methods reduce the water level to the invert of the main or bottom of the structure. The Contractor shall maintain this dewatered condition until the area around the structure has been backfilled to existing grade. No pipe shall be laid in water, or when the trench

conditions or the weather is unsuitable for such work, except by permission of the Engineer. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by approved means and no trench water shall be permitted to enter the pipe. It shall be borne in mind that precautions must be taken to prevent empty pipe from floating, should the trench become flooded before backfilling has been completed.

- F. Each piece of pipe shall be lowered into trench and installed separately. All pipe shall be laid in the trench so that it is firmly supported on the bedding material throughout its length.
- G. As shown on the plans, or as directed by the Engineer, the Contractor shall provide concrete anchors or thrust blocks (against undisturbed earth), joint harness, and concrete encasement where required. This work shall be included in the unit prices bid for installing pipe, fittings and appurtenances.
- H. Pieces of pipe or fitting which are known to be defective shall not be laid or placed. Any defective piece of pipe or fitting discovered after the piping is laid shall be removed and replaced with satisfactory pipe or fitting. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe. Cuts shall be made with proper tools for cutting the pipe. In the event the pipe is damaged as a result of the pipe being cut, the affected joint shall be rejected.
- I. Sand bedding as specified in Paragraph B above shall be required where rock, either loose or solid, is exposed at trench bottom at the required bury depth. It is intended that the pipe at all times is protected against damage from protruding objects and rests on a smooth and continuous bedding of earth or sand.
- J. The Contractor shall include in the unit prices for furnishing and installing mains, all rock excavation and sand bedding required.

3.02 PRESSURE TESTING

- A. After the pipe has been laid and partially backfilled all newly laid pipe, or any valved section of it, shall unless otherwise specified, be subjected to hydrostatic testing in accordance with AWWA Specification - "Pipe Laying", where applicable. The test pressure shall be at least 50% above normal working pressure, or the rating of the pipe, whichever is less. Tests on pipe with joints unbackfilled shall be for a duration of four (4) hours. Tests on pipe completely backfilled shall be for a duration of 24 hours. The Contractor shall furnish all labor, materials, and equipment necessary to test the system as described herein.
- B. Allowable leakage shall not exceed 10 gal./in.dia.mile/24 hours, or the limits established in AWWA Specification C-600 latest revision, as measured in a manner approved by the Engineer, whichever is less for the type of pipe being tested.

- C. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section of it, necessary to maintain the specified test pressure after the pipe has been filled with water and the air expelled.
- D. Any defects, cracks or leakage that may develop, or that may be discovered either in the joints or in the body of the castings, shall be promptly made good by the Contractor, at his own expense, and to the satisfaction of the Engineer.
- E. If directed by the Engineer or required by the specifications, further leakage tests shall be run upon combined lengths of the newly laid mains.
- F. Should any tests of combined sections of pipe laid disclose leakage per mile of pipe greater than that specified or if individual sections show leakage greater than the specified limit, the Contractor shall, at his own expense, locate and repair the defective joints and/or pipe until the leakage is within the specified allowance.
- G. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, valved taps shall be made at points of highest elevation along the water main as required for installation of manual air release valve pits. These air vent installations are necessary for the Contractor to satisfactorily pressure test, flush and sterilize the water mains.
- H. The air release valve and combination air/vacuum release valve installations shall be in accordance with the Miscellaneous Details contained in the plans.
- I. All exposed pipes, fittings, valves, hydrants and joints shall be carefully examined during the open trench test. Any cracked or defective pipes, fittings, valves or hydrants discovered in consequence of this pressure test shall be removed and replaced with sound material at the Contractor's expense, and the test shall be repeated until satisfactory to the Engineer.
- J. Any valved pipe section may be subjected to hydrostatic pressure, inspected, and tested for leakage at any convenient time after partial completion of backfill, or as directed by the Engineer or his authorized representative.

In general, the Contractor shall provide system pressure testings as follows:

1. Fill pipe with water until all air is exhausted.
2. Raise pressure to manufacturer's rated working strength of pipe or design pressure plus 50%, whichever is less by means of pumping from a container.
3. Refill container and maintain pressure for a minimum of four (4) hours.
4. Measure water required to refill container to pre-test level.

- K. The Engineer and/or his authorized representative shall supervise the testing specified herein and complete test results in report form shall be submitted to or filed by the Engineer. The test shall be conducted using pressure gauges furnished by the Owner.

3.03 CONNECTIONS

A. Type A Connection (Pressure Tap):

The Contractor shall furnish and install complete where indicated on the plans or indicated in the proposal forms pressure taps. These taps shall include a mechanical joint tapping sleeve with flanged mechanical joint tapping valve.

The installation shall also include a valve box as a part of the installation. The work shall include all labor, material, and equipment necessary to provide a complete tap as set out above and hereinafter.

The outlet tapping sleeves shall be designed for a water working pressure of the line being tapped. The valve and sleeve shall be provided with the necessary test plugs for pressure testing. Dimensions shall be such that the tapping sleeves can be installed on the Class of pipe being tapped. All material shall be in accordance with AWWA Specifications.

The Contractor shall provide competent personnel to make all pressure taps.

The Contractor shall, after the tapping sleeve and valve are installed and properly supported on concrete pads, pressure test the installation at or above the working pressure in the presence of the Inspector to prove no leakage is present. After this test and before the tap is made, the Contractor shall provide a poured concrete thrust block behind the tapping sleeve providing a bearing area of not less than 15 square feet against undisturbed soil.

3.04 DISINFECTION

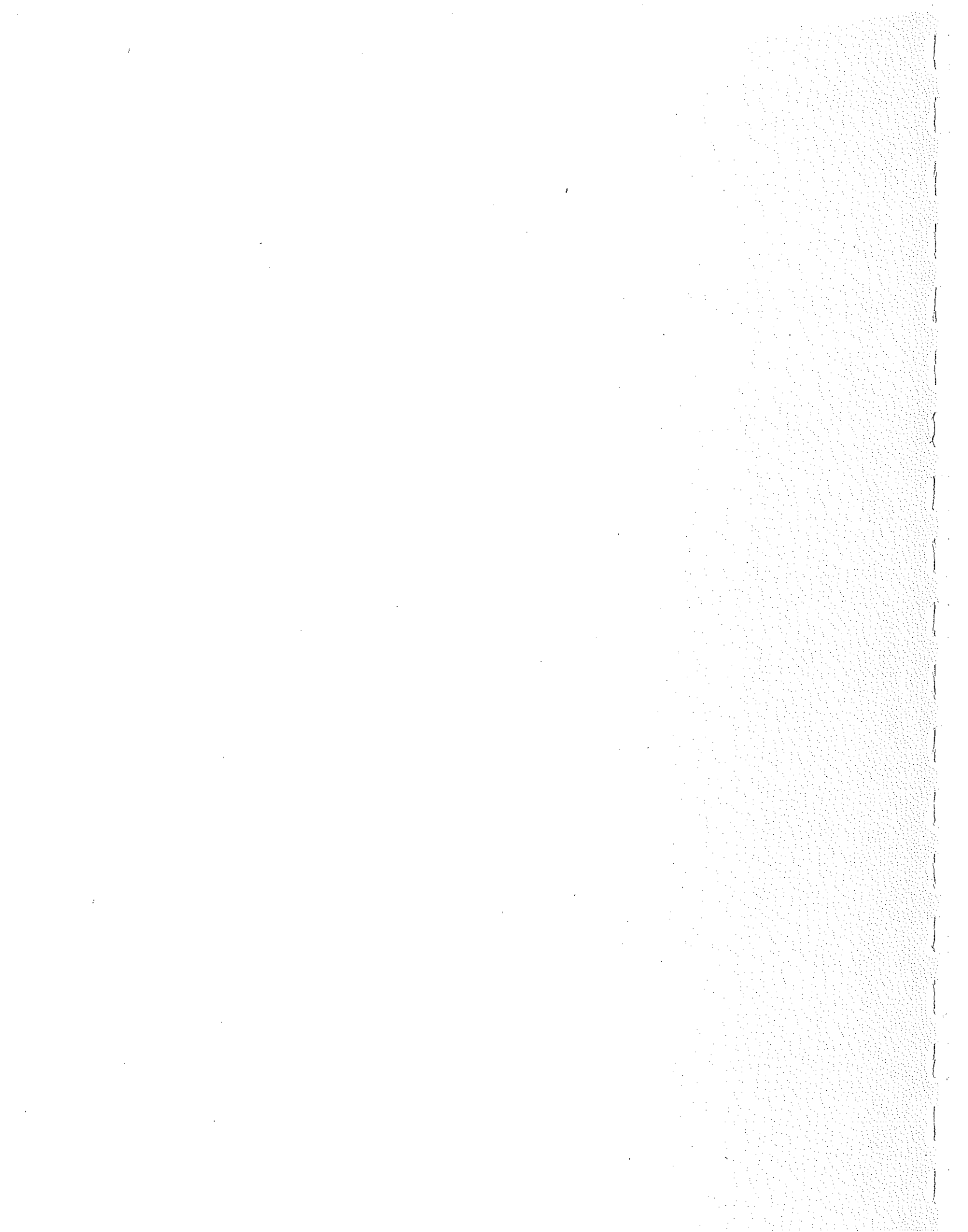
- A. No water distribution piping installed shall be placed in service until it has been pressure tested and disinfected. Disinfection procedures shall be as follows, unless more stringent procedures are required by AWWA Specifications C-601.
- B. After testing, a solution of hypochlorite, using HTH or approved equal, shall be introduced into the section of piping being disinfected, sufficient to insure a chlorine dosage of at least 50 ppm in the pipe. While the solution is being applied, the water should be allowed to escape to the ends of the section until tests indicate that a dosage of at least 50 ppm has been obtained throughout. The lines shall be kept full of the chlorinated solution for a period of 24 hours, and sufficient hypochlorite added, if necessary, to insure a residual at the end of this period of at least 10 ppm. The mains shall then be thoroughly flushed with potable water.

- C. Samples shall not be taken from flushing hydrants or any unsterilized equipment. Samples may be taken through sampling yokes at individual meter installations or rise pipe from corporation cocks installed in the water main. All sampling locations shall be approved either by the Engineer or the Public Health Agency having jurisdiction.
- D. All water required for the filling, hydrostatic testing, disinfection and flushing of water mains shall be obtained from the Owner. Cost of the water shall be at the Owner's lowest wholesale rate.
- E. After disinfection and flushing, the Contractor must secure and obtain satisfactory bacteriological samples and results of the finished water from the Public Health Agency having jurisdiction. The satisfactory report must be submitted to the Owner and Engineer before authorizing domestic consumption of the water. Disinfection procedures shall be continued until approved samples have been obtained.

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DIVISION 15 – MECHANICAL



2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

CONSTRUCTION SPECIFICATIONS

** INDEX **

SECTION

DIVISION 15 - MECHANICAL

15120 Valves and Hydrants
15177 Composite Elevated Water Storage Tanks

SECTION 15120

VALVES AND HYDRANTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall provide all labor, materials and equipment necessary to furnish and install all valves and appurtenances which are not included as an integral part of other equipment under other items, of the type shown on the drawings or required for proper process operations.
- B. All of the valves described herein are not necessarily included in this contract. Bidders shall verify from the drawings and proposal bid schedule the specific valves and operator types required for this work.

1.02 SUBMITTALS

- A. Provide shop drawings in accordance with Section 01340.

PART 2 PRODUCTS

2.01 GATE VALVES

- A. All hand-operated gate valves, three inches (3") and larger shall conform to the latest standard specifications of the American Water Works Association (AWWA) Section C-509 for resilient seated valves. All gate valves installed under this contract shall be of the same class as the pipe on which they are installed. Valves shall have joint ends compatible with type of pipe used, non-rising stems, 2" square operating nut and shall open "left".
- B. All gate valves, 2-1/2" and smaller, shall be of an Engineer approved manufacture and suitable for the service required. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. All valves shall be designed to take the full unbalanced pressure upon either face.
- C. Underground valves shall be provided with boxes, covers and operating nuts extended to grade. All underground valve boxes shall have adjustable cast iron bodies.
- D. All gate valves shall be designed for a minimum working pressure of 150 lbs. per square inch or the maximum pressure shown on the plans.

2.02 BUTTERFLY VALVES

- A. All valves, 14" and larger, shall be the butterfly type and shall have mechanical joint ends, suitable for buried service. The valve seat shall be molded, vulcanized, and bonded to the valve body.
- B. They shall be manufactured in accordance with AWWA Specification C-504 and shall be capable of operating at 150 psi. All valves shall be gear operated with valve boxes to extend to the ground surface. Position indicator shall be furnished. Valves shall be manufactured by Pratt, DeZurik, M. & H., American-Darling, Dresser or Engineer approved equal. Manufacturer shall have manufactured tight closing rubber seated butterfly valves for a period of five years.
- C. Valves shall be installed with operators in the vertical, plumb position and resting on compacted dense graded aggregate. Any settlement or misalignment of valves or valve boxes will not be acceptable. At the conclusion of installation, all valve boxes shall be collared with precast collars, 24 inches outside diameter, four inches thick.
- D. All butterfly valves shall be of the tight closing, rubber seat type with rubber seats which are recess mounted and securely fastened to the valve body. No metal-to-metal sealing surfaces permitted. Valves shall be bubble-tight at 150 psi with flow in either direction, and shall be satisfactory for applications involving throttling service and/or frequent operation and for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90° from the full open position to the tight shut position. Valves shall meet the full requirements of the applicable classes of AWWA Standard C-504, latest edition.

2.03 HYDRANTS

- A. Hydrants shall be installed at locations shown on the plans. Included with each hydrant shall be its own 6-inch gate valve and box. The specific placement of the hydrants shall be determined in the field with the Engineer prior to final installation. Hydrants shall be furnished and installed in accordance with the "Standard Details" drawing of the Engineer's plans.

PART 3 EXECUTION

3.01 TESTING

- A. The Contractor shall make all valves tight under their working pressure after they have been installed and before they are placed in operation. Any defective parts shall be replaced at the Contractor's expense.
- B. All valves shall be pressure tested and sterilized in conjunction with their adjoining piping.

3.02 INSTALLATION AND STORAGE

- A. The valves and appurtenances shall be installed in accordance with the installation manual furnished by the valve manufacturer. Extreme care shall be used in the handling, storage and installation of these valves to prevent damage or distortion of the equipment and to insure proper performance.

3.03 SPARE PARTS AND TOOLS

- A. Repair or service parts of one of each type of valve shall be furnished and stored as directed by Engineer.

- B. The equipment shall include, in general, the following items:

Special tools required for maintenance or operation of valves.

Gaskets, rings, seals, packing, lubricants, bolts, washers, operation manuals, drawings and etc., required to maintain valves in proper operating service.

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SECTION 15177

COMPOSITE ELEVATED WATER STORAGE TANKS

PART 1 GENERAL REQUIREMENTS

1.01 SCOPE

- A. The Contractor shall be responsible for all labor, materials and equipment necessary for the design, fabrication, construction, painting, disinfection and testing of a welded steel water storage tank supported by a reinforced concrete pedestal, commonly referred to as a Composite Elevated Tank (CET). Design and construction of the Composite Elevated Tank shall conform to all requirements of AWWA D100 Standard for Welded Steel Tanks for Water Storage except as modified by the requirements of these Contract Documents.

1.02 CONFIGURATION

- A. The acceptable styles of composite elevated tanks are as shown on the plans. All configurations shall utilize a concrete support wall and a steel tank for watertight containment.

1.03 QUALIFICATION OF MANUFACTURER

- A. The design and construction of the composite elevated water storage tank shall only be undertaken by a Contractor with a minimum of five (5) years experience with elevated tank construction. The Contractor must be able to demonstrate experience through the design and construction of at least five (5) composite elevated water tanks. The Contractor shall not subcontract any of the following portions of the project:
1. Design of the steel tank and concrete support structure.
 2. Construction of the concrete support structure.
 3. Construction of the steel tank.

1.04 SUBMITTALS

- A. The bidder shall submit with his proposal:
1. A list of five composite elevated tanks constructed within the last five (5) years, including the Owner, tank capacity and the Engineer.
 2. A preliminary drawing of the tank showing major dimensions and plate thickness upon which his bid is based, the high and low water levels and the dimensions of the supporting pedestal.
 3. A foundation design drawing showing preliminary dimensions and approximate quantities of concrete and reinforcing steel.

No bid will be considered unless this information is provided with the bid.

1.05 STANDARD SPECIFICATIONS

- A. All work on the water storage tank shall fully conform to the requirements of the latest published editions of the following Standard Specifications:

1. AWWA (American Water Works Association), D100 Standard for Welded Steel Tanks for Water Storage.
2. AWWA D102 - Standard for Painting Steel Water Storage Tanks.
3. AWWA C652 - Standard for Disinfection of Water Storage Facilities.
4. AWS (American Welding Society).
5. NSF (National Sanitation Foundation) 61 - Materials in contact with potable water.
6. Steel Structures Painting Council Manual - Volume 1 - Good Painting Service.
7. Steel Structures Painting Council Manual - Volume 2 - Systems and Specifications.
8. ACI 301 (American Concrete Institute) - Specifications for Structural Concrete for Buildings.
9. ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete.
10. ACI 305 - Hot Weather Concreting.
11. ACI 306 - Cold Weather Concreting.
12. ACI 318 - Building Code Requirements for Reinforced Concrete.
13. ACI 347 - Guide to Formwork for Concrete.
14. ACI 371R - Guide for the Analysis, Design and Construction of Concrete Pedestal Water Towers.

1.06 TANK DETAILS

- A. The steel sections of the elevated tank shall be all-welded construction of the most economical design. All members of structural steel or of reinforced concrete shall be designed to safely withstand the maximum stresses to which they may be subjected during erection and operation.
 1. The minimum operating capacity of the storage tank will be 2,000,000 US gallons.
 2. The capacity of the tank, low to high water level, shall be contained within a maximum operating range of 42 feet.
 3. The height of the tank, top of foundation to High Water Level, shall be as shown on the plans.
 4. Top of foundation elevation shall be as shown on the plans.
 5. The existing ground elevation is as shown on the plans.
 6. The finished ground elevation shall be as shown on the plans.

1.07 PERMITS AND EASEMENTS

- A. Permits, licenses, airspace authority approval and easements required for the construction of the elevated tower and associated works shall be provided by the Owner.

1.08 WORKING DRAWINGS

- A. After contract award and prior to construction, the Contractor shall provide working drawings and design calculations for the elevated steel tank, the concrete pedestal, and the foundation. Drawings shall show the size and location of all structural components and reinforcement, the required strength and grade of all materials and the size and arrangement of principle piping and equipment. The drawings and calculations shall bear the certification of a Professional Engineer licensed in the State of Kentucky. The design

coefficients and resultant loads for snow, wind and seismic forces, and the methods of analysis shall be documents.

PART 2 PRODUCTS

2.01 DESIGN

A. General

The structural design of the elevated storage tank shall conform to the following design standards except as modified or clarified as follows:

1. Foundations - AWWA D100 and ACI 318
2. Concrete Support Pedestal - ACI 371R - Guide for the Analysis Design and Construction of Concrete Pedestal Water Towers.
3. Steel Tank - AWWA D100
4. Steel Tank Painting - AWWA D102

2.02 LOADS

2.02.1 SEISMIC LOAD:

- A. Design in accordance with AWWA D100, Section 13.
- B. The tank contents shall be considered as a fixed mass, and no decrease in lateral load shall be taken from the inclusion of sloshing effects.

2.02.2 WIND LOAD

- A. Wind pressure shall be determined in accordance with AWWA D100-96, Section 3.1.4 for a 100 mph wind velocity.

2.02.3 SNOW LOAD

- A. Snow load shall be determined in accordance with AWWA D100, Section 3.1.3 for 30 psf minimum loading.

2.03 FOUNDATION

- A. A geotechnical investigation has been carried out at the site and a copy of the report is included with the Contract Documents. Allowable bearing capacities are defined in this report. The concrete foundation shall be designed and constructed by the Contractor based upon the recommendations in the geotechnical report.

2.04 CONCRETE SUPPORT PEDESTAL

2.04.1 GENERAL

- A. The concrete support pedestal shall have a minimum wall thickness of eight (8) inches exclusive of any rustications, fluting or other architectural relief. Minimum concrete compressive strength shall

be as specified in Section 2.08.2. Maximum concrete design compressive strength shall be 6,000 psi.

2.04.2 REINFORCEMENT

- A. Not more than sixty (60) percent nor less than fifty (50) percent of the minimum reinforcement in each direction shall be distributed to the exterior face, and the remainder to the interior face.

2.04.3 WALL OPENINGS

- A. Walls adjacent to openings wider than three (3) feet shall be designed as an effective column in accordance with ACI 371R.

2.04.4 SMALL OPENINGS

- A. Walls adjacent to openings or penetrations having a horizontal dimension of three (3) feet or less may be reinforced in accordance with the simplified method of ACI 371R.

2.04.5 PILASTERS

- A. Monolithic pilasters may be used adjacent to openings. Pilasters shall extend above and below the opening a sufficient distance to effect a smooth transition of forces into the wall without creating excessive local stress concentrations. Pilasters shall consist of a thickened reinforced concrete wall section that is integrally formed and placed on the interior of the pedestal wall.

2.04.5 PIPE BOLLARDS

- A. If an opening is to be used as a vehicle entrance, provide two (2) eight-inch diameter steel safety posts outside of the opening to protect the door. Safety posts shall be filled with concrete.

2.05 TANK BOTTOM

2.05.1 SUPPORT INTERFACE

- A. The steel tank shall be anchored to the concrete support structure. The interface region includes those portions of the support wall, tank floor, ringbeam, and steel tank affected by the transfer of forces from the tank floor and steel tank to the support wall.

2.05.2 DOME TANK FLOOR DESIGN

- A. Concrete dome floors shall be designed on the basis of elastic shell analysis. Consideration of edge effects that cause shear and moment shall be included in the analysis and design.

2.05.3 LINER PLATES

- A. The concrete tank floor shall be covered with a welded steel liner to provide a watertight boundary. The minimum thickness for lap welded liner plates shall be 1/4 inch.

2.05.4 SUSPENDED STEEL FLOORS

- A. The analysis and design of the concrete support element shall include consideration of the following loading effects:
1. Vertical loads not centered on the wall due to construction inaccuracies.
 2. Horizontal shear loads caused by an out-of-plumb skirt plate, or temperature differences between the steel tank and concrete wall.
 3. Local stability at the top of the wall.

2.05.5 SLAB FLOORS

- A. The support wall, tank floor and steel tank shall be analyzed for in-plane axial forces, radial shear, and moment for all loading conditions. The degree of fixity of the steel tank to the tank floor shall be considered.

2.06 STEEL TANK

2.06.1 GENERAL

- A. The materials, design, fabrication, erection, welding, testing and inspection of the steel tank shall be in accordance with the applicable sections of AWWA D100 except as modified in this document.

2.06.2 MINIMUM PLATE THICKNESS

- A. The minimum thickness for any part of the structure shall be 3/16-inch for parts not in contact with water and 1/4 inch for parts in contact with water.

2.06.3 TANK CONES

- A. For areas of the elevated tank where the water is supported by a steel cone, the Contractor shall submit evidence that the design is based on a shell analysis that is capable of recognizing the degree of imperfection which may be built into the structure and shall be such as to create a minimum factor of safety of 2.0 against buckling. The analysis shall include the effects of material and geometric non-linear ties and residual stress. The modeled imperfection shall not be less than $0.04/RT$ over a length of $4/RT$, where R is the radius normal to the plate at the point of consideration, and T is the plate thickness.
- B. In lieu of the above steel cone analysis, the design shall be based on the use of Table 9 of AWWA D100 to determine the allowable compressive stress, with R being the radius normal to the surface of the steel.

2.06.4 TANK ROOF

- A. All interior roof plate lap joints shall be sealed by continuous welding or caulking. If roof is supported by rafters, any unwelded portions of the rafter to roof plate joint shall be caulked.

2.07 CONSTRUCTION

2.07.1 CONCRETE FOUNDATION

- A. The foundation shall be designed and constructed to safely and permanently support the structure. The basis of the foundation construction shall be commensurate with the soils investigation data included herein as part of these specifications. Appropriate changes to construction schedule and price will be negotiated if, during excavation, soil conditions are encountered which differ from those described in geotechnical report. The concrete foundation shall be constructed in accordance with ACI 301. Minimum concrete compressive strength shall be as specified in Section 03300, "Cast-In-Place Concrete".

2.08 CONCRETE PEDESTAL

2.08.1 WATER CEMENT RATIO

- A The water-cement ratio shall not exceed 0.45.

2.08.2 COMPRESSIVE STRENGTH

- A. The minimum design compressive strength shall comply with the following:

Support walls, dome tank floor, ring beam,	
Slab tank floor	4000 psi
Flat slab on grade with door opening less than 8 feet	4000 psi
Flat slab on grade with door opening greater than 8 feet	4000 psi
Foundation	4000 psi

2.08.4 AIR ENTRAINMENT

- A. All concrete shall be air entrained in accordance with ACI 318.

2.08.4 PROPORTIONING

- A. The proportions of materials for concrete shall be established to provide adequate workability and proper consistency to permit concrete to be worked readily into the forms and around reinforcement without excessive segregation or bleeding with the methods of placement and consolidation employed. Fly ash shall not be included in mix design for any phase of concrete construction.

2.08.5 ADMIXTURES

- A. Admixtures may be used as required to achieve the air content, density, workability, slump and setting characteristics of concrete in order to satisfy the design strength, durability and architectural requirements.

2.08.6 PRODUCTION

- A. Measuring, mixing and transporting of concrete shall comply with the requirements of ACI 318 and the recommendations of ACI 304R. Drop chutes or tremies shall be used in walls or columns over 5 feet in height to avoid segregation of the concrete and to allow it to be placed through the cage of reinforcing steel. Vibrators shall not be used to move the mass of concrete through the forms.

2.08.7 WEATHER

- A. Concrete shall not be placed in rain, sleet, snow or extreme temperatures unless protection is provided. During hot or cold weather, the recommendations of ACI 305 and ACI 306 shall be followed.

2.08.8 TESTING

- A. Five cylinders shall be cast from each pedestal lift, dome, and ring beam. Cylinders shall be tested at 3 days, 7 days, and two at 28 days. One cylinder shall be held as a spare and tested at a later date, if necessary. Concrete temperature, slump and air content measurements shall be made for each set of cylinders. The Contractor shall retain an independent testing laboratory to collect samples and perform the testing. Copies of all test results shall be provided to the Contractor.

2.09 PEDESTAL FORMWORK

2.09.1 GENERAL

- A. Formwork shall be designed to safely support all construction and design loads. It shall be designed to ensure that the concrete components of the structure will conform to the correct dimensions, shape, alignment, elevation and position with tolerances specified in Section 2.09.6. Forms may be removed when the concrete has attained sufficient strength such that it will not be damaged from removal operations or subsequent load. Form surfaces shall be cleaned of foreign materials and coated with a release agent prior to placing reinforcement.

2.09.2 CONCRETE PEDESTAL

- A. The support pedestal shall be constructed using a form system having curved, prefabricated form segments. Form faces shall be metal or wood faced with plastic. Concrete lifts shall be a minimum of 4 feet and a maximum of 12 feet. Metal form ties that remain within the wall shall be set back 1.5 inches from the concrete surface.

2.09.3 RUSTICATIONS

- A. A uniform pattern of vertical and horizontal rustications shall be provided for architectural relief. Rustications shall be a maximum of 1 inch deep. Construction joints shall be located in the rustications. The top of each concrete lift shall be finished with a grade strip.

2.09.4 FORMED SURFACES

- A. Finishing of formed surfaces shall be as follows:
1. Exterior and interior exposed surfaces of the support structure shall have a smooth as-cast finish. The surface shall be left with the texture imprinted by the form. Defects and tie holes shall be patched and all fins exceeding 1/4 inch in height shall be removed by chipping or rubbing.
 2. Concrete not exposed to view may have a rough as-cast finish. Any form facing material may be used providing the forms are substantial and sufficiently tight to prevent mortar leakage. Slabs on grade shall be steel trowelled.

2.09.5 TANK FLOOR FORMING

- A. The formwork for the flat slab or dome tank floor shall be designed to support all loads including the weight of the forms, concrete, personnel, equipment, temporary storage and impact forces. Unsymmetrical placement of concrete shall be considered in the design.

2.09.6 TOLERANCES

- A. Dimensional tolerances for the concrete support structure shall comply with the following:
- | | |
|--|---------------|
| a) Variation in thickness of wall | -3.0%, +5.0% |
| b) Variation in thickness of dome | -6.0%, +10.0% |
| c) Wall variation from plum in any 5 feet. | 3/8 inch |
| d) Wall variation from plum in any 50 feet | 1.5 inches |
| e) Maximum variation in total height | 3 inches |
| f) Support wall diameter variation
not to exceed 3 inches | 4% |
| g) Dome tank floor radius variation | 1.0% |
| h) Level alignment variation from horizontal plane | 1/2 inch |
| i) Level alignment variation from specified elevation | 1 inch |
- B. The offset between adjacent pieces of formwork facing material shall not exceed the following:
- | | |
|-------------------------------|----------|
| a) Exterior exposed surfaces: | 1/8 inch |
| b) Interior exposed surfaces: | 1/4 inch |
| c) Unexposed surfaces: | 1/2 inch |
- C. The finish tolerance of trowelled surfaces shall not exceed the following when measured with a 10 foot straightedge or sweep board:
- | | |
|---|----------|
| a) Exposed floor slab: | 3/8 inch |
| b) Tank floors: | 1/4 inch |
| c) Concrete support for suspended steel tank floor: | 1/4 inch |

2.10 QUALITY ASSURANCE

- A. The Contractor shall implement a quality control procedure to measure vertical alignment, radius and horizontal level during the construction of the support pedestal. At the end of each day where a concrete lift has been poured the Contractor shall measure the following:

1. Vertical alignment and radius at four points on the interior of the pedestal. Points shall be located at 90 degree intervals.
2. Horizontal level at four points at 90 degree intervals on the top of the form.
3. Wall thickness at four points at 90 degree intervals.

Vertical alignment and horizontal level shall be checked using a visible beam laser or equivalent as accepted by the Owner. An inspection report shall be provided to the Owner on project completion.

2.11 REINFORCEMENT

2.11.1 GENERAL

- A. Reinforcement shall be clearly indicated on the construction drawings. Locations, spacing, as well as lap splice lengths of reinforcement and concrete cover shall be shown.

2.11.2 BAR LISTS

- A. The bar lists shall show the number of each type of bar, its dimensions and shape, the bar size, grade of steel and the mark number of identification. Drawing shall show all slabs, elevations of all walls and have sufficient sections to facilitate placement and checking.

2.11.3 CONCRETE COVER

- A. The minimum clear distance between the reinforcing steel and the surface of the concrete shall be as follows:
 - a) Concrete foundations permanently exposed to earth:

Cast against earth	3 inches
Cast against forms or mud slabs	
No. 6 bar and larger	2 inches
No. 5 bar and smaller	1.5 inches
 - b) Concrete support structure:

Exterior surfaces	
No. 6 bar and larger	2 inches
No. 5 bar and smaller	1.5 inches
Interior surfaces	1 inch
 - c) Sections designed as beams or columns
 1.5 inches | - d) Tank floors or intermediate floor slabs
 1.5 inches |

2.12 STEEL TANK CONSTRUCTION

2.12.1. GENERAL

- A. The erection of the steel tank shall comply with the requirements of Section 10 of AWWA D100 except as modified by these documents.

2.12.2 WELDING

- A. All shop and field welding shall conform to AWS and AWWA D100, Section 10. Before any welding is performed, the constructor shall

make certain that the welders or welding operators have their credentials for acceptance.

2.12.3 FABRICATION

- A. All fabrication and shop assembly shall conform to the requirements of AWWA D100, Section 9, Shop Fabrication.

2.12.4 ERECTION

- A. Plates subjected to stress by the weight or pressure of the contained liquid shall be assembled and welded in such a manner that the proper curvature of the plates in both directions is maintained. Plates shall be assembled and welded together by a procedure that will result in a minimum of distortion from weld shrinkage.

2.12.5 WELDING TO EMBEDDED MEMBERS

- A. Weld procedures and details specifically designed to minimize cracking and spalling of the concrete shall be used when it is necessary to weld on steel members embedded in concrete. The weld procedures shall consider plate thickness, weld process, weld type and size, weld sequence, heat input and distance from the concrete.

2.12.6 LINER PLATE

- A. All liner plate seams shall be lap welded on the top side only with continuous fillet welds or continuous butt welds with backup bars. The minimum thickness for lap welded liner plates shall be 1/4 inch. All liner plate welds shall be tested by the vacuum box testing method before the tank is painted.

2.12.7 GROUTING

- A. The liner plates shall be formed to match the shape of the concrete dome and may be placed directly on the concrete. Unformed liner plates may be used provided the liner plates are erected to provide at least a 1 inch grouting space between the liner plate and the concrete dome. The space shall be completely filled with a flowable grout using a procedure that removes entrapped air. Liner plates used on flat slabs will not require grouting.

2.12.8 BASE PLATE

- A. The base plate used for the suspended steel bottom configuration shall be erected to provide at least a 1 inch grouting space between the base plate and the concrete. The space shall be completely filled with a non-shrink, non-metallic grout of sufficient strength to withstand the design loads.

2.12.9 TESTING

- A. Testing for both shop and field welds shall be in accordance with AWWA D100, Section 11, Inspection and Testing. All testing shall be performed prior to interior and exterior painting. The testing

shall be performed by an independent testing agency with all costs included in the Contractor's bid and paid by the Contractor.

2.13 ACCESSORIES

2.13.1 GENERAL

- A. The following accessories shall be provided in accordance with these specifications. All items shall be in full conformity with the current applicable OSHA safety regulations and the operating requirements of the structure.

2.13.2 LADDERS

- A. Interior vertical access ladders shall be provided at the following locations:
- 1) Grade to upper platform.
 - 2) Upper platform to tank floor manhole.
 - 3) Upper platform to steel tank roof mounted on access tube interior.
 - 4) Exterior of access tube to provide access from the roof manhole to the tank floor.
- B. Ladders bolted to the concrete pedestal shall be of galvanized steel or aluminum construction. Ladders welded to the steel tank shall be painted steel. Ladder side rails shall be a minimum 3/8 inch by 2 inches with a 16 inch clear spacing. Rungs not less than 3/4 inch, round or square, spaced at 12 inch centers. The surface of the rungs shall be knurled, dimpled or otherwise treated to minimize slipping. At platforms or landings, the ladder shall extend a minimum 4 feet above the platform. Ladders shall be secured to adjacent structures by brackets located at intervals not exceeding 10 feet. Brackets shall be of sufficient length to provide a minimum distance of 7 inches from the center of the rung to the nearest permanent object behind the ladder.

2.13.3 REST SEATS

- A. Aluminum swing out rest seats shall be provided as required on pedestal ladders over 50 feet high at a maximum of 50 foot intervals. Rest seats shall be operable without removing fall arrest equipment.

2.13.4 FALL PROTECTION

- A. Ladders shall be equipped with a fall arrest system meeting OSHA regulations. The system shall be supplied complete with safety harnesses, locking mechanisms, lanyards, and accessories for two persons.

2.13.5 UPPER PLATFORM

- A. A four foot wide upper platform shall be located at the top of the pedestal to provide access from the pedestal ladder to the roof access ladder located on the interior of the access tube. Platform shall be provided with handrails, midrails and toe plates, which

meet or exceed the requirements of OSHA. All components shall be of either galvanized steel or aluminum construction. Grating shall be used for the walking surfaces.

2.13.6 ROOF HANDRAIL

- A. A roof handrail shall be provided surrounding the roof manholes, vents and other roof equipment. Handrail shall comply with OSHA requirements.

2.14 OPENINGS

2.14.1 ROOF HATCHES

- A. Provide three access hatches on the roof of the tank. One hatch shall be 30 inch diameter and allow access from the roof to the interior of the tank. The hatch will be hinged and equipped with a hasp for locking. The hatch cover shall have a 2 inch downward edge. The second hatch will be 24 inch diameter and flanged with a removable cover so constructed that an exhaust fan may be connected for ventilation during painting operations. The openings shall have a minimum 4 inch curb.
- B. Provide one 30 inch hinged access hatch on the access tube roof. The hatch cover shall have a 2 inch downward edge.

2.14.2 TANK VENT

- A. The tank vent shall be centrally located on the tank roof above the maximum weir crest elevation. The tank vent shall have an intake and relief capacity sufficiently large that excessive pressure or vacuum will not be developed during maximum flow rate. The vent shall be designed, constructed and screened so as to prevent the ingress of wind driven debris, insects, birds and animals. The vent shall be designed to operate when frosted over or otherwise clogged. The screens or relief material shall not be damaged by the occurrence and shall return automatically to operating position after the blockage is cleared.

2.14.3 TANK FLOOR MANHOLE

- A. A minimum 24" diameter access hatch shall be provided in the tank floor which is accessible from the upper platform or from a ladder that extends from the platform to the opening. The hatch shall open inward.

2.14.4 SUPPORT WALL VENT

- A. A removable louvered vent shall be located at the top of the support wall for access to the exterior utility rails located near the tank/pedestal interface. This vent shall be stainless steel or aluminum and have a minimum size of 24 inches by 36 inches.

2.14.4 ACCESS TUBE

- A. A minimum 42" diameter access tube shall be provided from the tank bottom to the tank roof.

2.14.5 RIGGING

- A. Interior and exterior rigging devices shall be provided for painting. A continuous bar or tee rail near the top of the exterior concrete support structure shall be provided. The rail may be attached to the support wall or steel tank. A utility rail attached to the roof, pipe couplings with plugs in the roof or other attachments that provide complete access for painting shall be furnished.

2.15 PIPING

2.15.1 GENERAL

- A. Standard weight carbon steel pipe painted with tank interior paint system shall be used where pipe is exposed to stored water inside the tank. Pipe material within the concrete pedestal shall be stainless steel with either welded or flanged fittings. Stainless steel pipe and fittings shall be minimum 10 gauge (U.S.), type 304L. Flanges shall be galvanized Class 150 with galvanized backing flanges. Pipe guides for horizontal support shall be attached to the support wall at intervals not exceeding 20 feet.

2.15.2 INLET/OUTLET PIPING

- A. Provide a 30 inch diameter inlet/outlet pipe that extends vertically from the base of the pedestal to the underside of tank floor. An expansion joint shall be provided in the vertical section of pipe. The expansion joint shall be constructed to accommodate any differential movement caused by settlement or thermal expansion and contraction. Inlet/Outlet pipe shall not extend above the LWL.

2.15.3 OVERFLOW

- A. The overflow pipe shall be designed to carry the maximum design flow rate of 2500 GPM. The overflow pipe will be 18 inch in diameter. A suitable weir shall be provided with the crest at High Water Level. The overflow pipe shall extend down from the weir box through the tank, pedestal, and base cone. The overflow pipe shall penetrate the column wall and discharge into a concrete overflow structure. The discharge shall be equipped with Tideflex Primary Overflow Protection as manufactured by Red Valve Company, Inc.

2.15.4 INTERIOR FLOOR

- A. A concrete slab-on-grade shall be provided inside the base cone. The floor shall be a minimum of 6 inches thick, and reinforced as shown on the plans. Isolation joints shall be provided at junctions with walls, columns, equipment or piping foundations. Floor thickness shall be thickened in area of door as necessary.

2.16 PEDESTAL DOORS

2.16.1 PERSONNEL DOOR

- A. A 36" x 80" insulated hollow metal personnel door shall be provided in the concrete pedestal. Doors and frames shall be 18 gauge and 16 gauge respectively with concealed reinforcement at hardware locations. Doors shall be 1 3/4 inch thick, flush type manufactured from painted steel. Doors shall have gaskets, thresholds, stops and three pair of stainless steel butt hinges per door. Door latch to be L-latch operated on both sides with built in lock.

2.16.2 OVERHEAD DOOR

- A. Provide a manually operated overhead steel rolling door located in the base of the tower. The door frame shall be fabricated of galvanized steel plate, fastened and reinforced on the interior face of the pedestal tower. The curtain shall be formed of 22-gauge steel interlocking slats designed for a wind loading of 20 psf. A 24-gauge steel hood shall be provided with a weather seal to protect the assembly. The curtain, bottom bar, brackets, guides, hood, pipe and chain shall be galvanized. Size and location of the overhead door shall be as indicated on the project drawings.

2.17 IDENTIFICATION PLATE

- A. A tank identification plate shall be mounted near the personnel door. The identification plate shall be corrosion resistant and contain the following information.
 - 1) Tank Contractor
 - 2) Contractor's project or file number
 - 3) Tank capacity
 - 4) Height to High Water Level
 - 5) Date erected

PART 3 EXECUTION

3.01 GUARANTEE

- A. The tank Contractor shall guarantee its work for a period of one year from the completion date defined in the contract documents to the extent that it will repair any defects caused by faulty design, workmanship or material furnished under the specifications. If Contractor is not advised of any defects within 30 days of end of guarantee period, guarantee shall be considered fulfilled and complete.
- B. All guarantees obtained by the tank Contractor from the manufacturer or installer of paint, equipment or accessories not manufactured by tank Contractor shall be obtained for the benefit of the Purchaser.

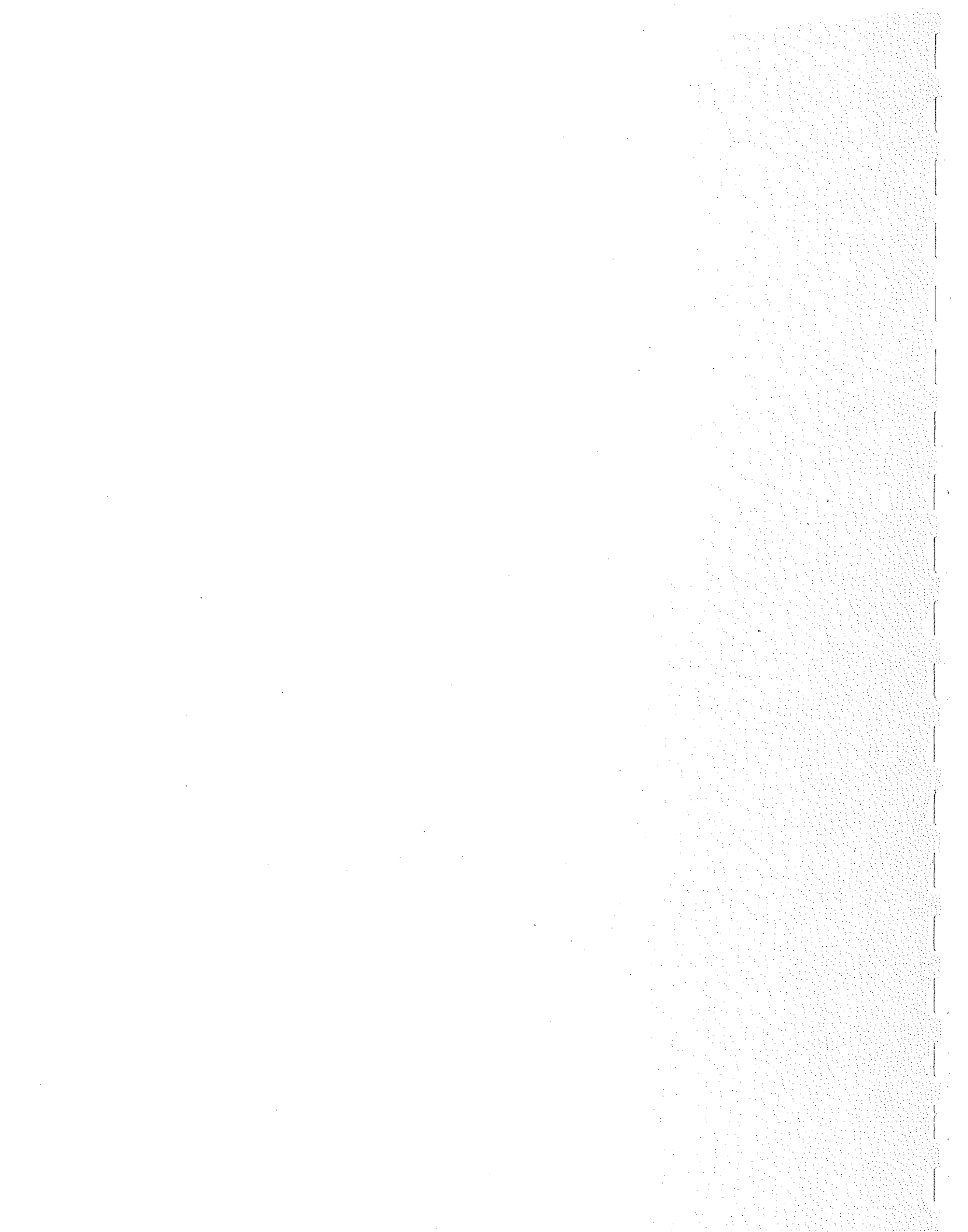
3.02 GENERAL

- A. Design foundation and tank.
- B. Submit and receive approval of design and shop drawings.

- C. Shop fabricate steel.
- D. Excavate for and construct concrete foundations.
- E. Erect structure.
- F. Clean and paint tank.
- G. Disinfect, fill and receive satisfactory bacteriological test.
- H. Place tank in service.
- I. Finish site work.

END OF SECTION

DIVISION 16 - ELECTRICAL



2005 IMPROVEMENTS

KENTUCKY HIGHWAY 146 TANK

for the

OLDHAM COUNTY WATER DISTRICT
BUCKNER, KENTUCKY

August 2005

CONSTRUCTION SPECIFICATIONS

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SECTION 16010

ELECTRICAL SPECIAL CONDITIONS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. General Conditions
- B. General Requirements - Division 1
- C. Equipment Specifications - Division 16

1.02 DESCRIPTION

- A. The Electrical Special Conditions are in addition to the General Conditions and General Requirement, and shall be an extension of these sections of the Specifications.
- B. The Electrical Special Conditions apply to all electrical materials, equipment, installations and services supplied under any portion of the Work.
- C. The Contractor shall coordinate the Electrical Special Conditions as applicable to any equipment, installations, and services of an electrical nature.

1.03 GENERAL REQUIREMENTS

- A. It is the intent of these Specifications and Drawings to provide an electrical installation of consistent quality, of uniform standards of installation and to have various portions of the Project compatible in design and execution to all other portions of the Work.

1.04 ELECTRIC SERVICES

- A. The Contractor shall coordinate with the electric utility for the electrical service.

1.05 CODES AND STANDARDS

- A. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations.
- B. These code requirements are to be considered minimum and are to be exceeded when so indicated on the Drawings and the Specifications.
- C. In case of difference between building codes, specifications, state laws and federal laws, local ordinances, industry standards and utility company regulations and the Drawings and Specifications, the most stringent shall govern. The Contractor shall promptly make required modifications.

- D. Non-Compliance: Should the Contractor perform any work that does not comply with the requirements of the applicable building codes, state and federal laws, local ordinances, industry standards, plans and specifications, and utility company regulations, he shall bear all costs in correcting all deficiencies.
- E. Applicable Codes and Standards shall include all the state laws, local ordinances, utility company regulations and the applicable requirements of the following nationally accepted codes and standards.
- F. Building Codes: Kentucky Building Code, National Electric Code, National Electrical Safety Code.
- G. Industry Standards, Codes and Specifications:
 1. IEE Institute of Electric and Electronic Engineers
 2. ASA American Standards Association
 3. ASTM American Society of Testing Materials
 4. ICEA Insulated Cable Engineers Association
 5. NBS National Bureau of Standards
 6. NEMA National Electrical Manufacturers Association
 7. NFPA National Fire Protection Association
 8. UL Underwriters Laboratories
 9. NECA Standard of Installation

1.06 SUBMITTALS

- A. Submit shop drawings for all equipment specified in conformance with Section 01340. The submittal must include a written statement of exceptions and deviations from these specifications.
- B. Shop drawings shall include complete data including physical dimensions and other information required for installation, performance capabilities and limitations, equipment wiring diagrams complete with sequence of operation, and schedules indicating locations when more than one type of an item is to be used. All shop drawings must be certified as being correct for the proposed work.
- C. Shop drawings, brochures or catalog cuts showing more than one size or model shall be marked to indicate the size or model proposed for the particular application.
- D. Prior to submittal, shop drawings shall be coordinated with the work of all other trades.
- E. Shop drawings shall be identified as to the specific equipment for which the shop drawing relates. Identification shall be by reference to the appropriate Article of the Specifications in which the equipment is specified.

1.07 INSTRUCTION MANUALS

- A. Two sets of Instruction Manuals shall be furnished to the Engineer prior to acceptance with each set to include the following:

1. Manufacturer's parts list identified with the make, model and serial number of the equipment furnished.
 2. Schematic control, and wiring diagrams identifying the location and function of all system components and controls.
 3. Installation, operation, lubrication and maintenance instructions.
 4. Manufacturer's recommended spare parts list.
 5. Test data and performance curves where applicable.
- B. Instruction manuals shall be loose leaf binders.
- C. All materials larger than 8-1/2 inches by 11 inches shall be neatly folded to the specified size in a manner which will permit easy unfolding without removal from the binder.
- D. All materials shall be neatly punched before insertion into the binder and all binding holes shall be reinforced.
- E. Use dividers between each category of equipment.
- F. Provide a typewritten Table of Contents for each binder.

1.08 WORK VERIFICATION AND FIELD MEASUREMENTS

- A. All dimensions and clearances affecting the installation of work shall be verified in the field in relation to established datum, to building openings and to the work of other trades.
- B. Location of all equipment and systems shall be coordinated to preclude interferences with other construction.
- C. Should interferences occur which will necessitate deviations from layout or dimensions shown on the Drawings, the Engineer shall be notified and any changes approved before proceeding with the work.

1.09 RECORD DRAWINGS

- A. A record shall be kept of all deviations in location or elevation of any underground or concealed installation from that shown on the Contract Drawings. Records shall consist of marked shop or Contract Drawings and shall be submitted to the Engineer at any time upon request during or after completion of construction. No such deviations from the Contract Drawings or approved shop drawings shall be made without prior approval by the Engineer.

1.10 ACCESSIBILITY

- A. A record shall be kept of all deviations in location or elevation of any underground or concealed installation from that shown on the Contract Drawings. Records shall consist of marked shop drawings or Contract Drawings and shall be submitted to the Engineer at any time upon request during or after completion of construction. No such deviations from the Contract Drawings or approved shop drawings shall be made without prior approval by the Engineer.

1.11 WARRANTIES AND GUARANTEES

- A. All warranties and guarantees shall be as specified in Division 1 except as modified by more stringent requirements in the individual specification sections.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 FASTENING TO BUILDING STRUCTURES

- A. The methods of attaching or fastening equipment or equipment supports or hangers to the building structure shall be subject to approval by the Engineer at all times. Submit shop drawings or samples for approval before proceeding with the work.
- B. Cutting, burning, drilling, welding or the use of explosive driven fasteners on building structures shall require prior approval by the Engineer for each type of application unless specifically shown on the Drawings.

3.02 MISCELLANEOUS WORK

- A. Excavation and backfilling for electrical work shall be the responsibility of the Electrical Contractor and shall meet the requirements of Division 2: Sitework.
- B. Contractor shall provide all roof openings and flashing required by the electrical work.
 - 1. Unless otherwise detailed on the Drawings, all conduits through roofs shall be installed using pitch pockets and counterflashing.
- C. The Contractor shall provide all pads, bases and anchors required to complete the electrical work. The General Contractor will provide concrete bases as shown on the drawings.
- D. The Contractor shall provide all platforms and supporting stands for electrical equipment required to complete his work.
 - 1. Each piece of equipment or apparatus suspended from ceiling or mounted above floor level shall be provided with suitable structural support, platform or carrier in accordance with the best recognized practice.
 - 2. The Contractor shall exercise extreme care that structural members of the building are not overloaded by such equipment. In all cases, details of such hangers, platforms and supports, together with the total weights of mounted equipment shall be reviewed by the Engineer.
- E. Cutting and patching of new structures required for electrical work shall be provided as required. Such work shall be the responsibility of the Electrical Contractor, however, the work must be performed by workmen skilled in the appropriate trade.

- F. Ceiling and wall access panels for electrical equipment shall be provided by the General Contractor where shown or required for access to the electrical equipment.
- G. Holes Thru Structural Members, Slabs and Walls: Holes required for conduit of size 5" or smaller shall be sleeved. The Engineer shall be notified prior to any cutting.

3.03 SERVICE TIE CONNECTIONS

- A. Contractor shall check and verify all voltage and phasing of service tie connections at switchboards.
- B. Phasing to be maintained shall be A.B.C. top to bottom, east to west and north to south in all cases.

3.04 ELECTRICAL CONNECTIONS TO EQUIPMENT

- A. Electrical Contractor shall provide all connections to mechanical equipment supplied under various sections of these Specifications and shown in Drawings.
- B. All equipment shall be wired complete in each detail, including all interlocks, safety switches, control devices, starters and disconnects. Control wiring for equipment and interfacing may not be shown on drawings. Control wiring and conduits shall be furnished as required by equipment and control manufacturers to provide an operating system.
- C. Drawings include equipment as anticipated to be furnished; however, in case other makes, etc., are furnished than shown, the furnished equipment shall be wired completely, including all controls, as required at no additional cost to the Owner. Any additional cost shall be borne by the Contractor furnishing the equipment.
- D. All connections and wiring diagrams where shown on the Drawings are for bidding purposes only and the Electrical Contractor shall obtain final wiring diagrams from the Contractor furnishing the equipment. Diagrams as supplied shall be specifically for this Project and connected as shown on final diagrams at no additional cost.
- E. Motor sizes where shown on the Drawings are for bidding purposes only and the Electrical Contractor shall verify all motor sizes prior to wiring. Contractor shall furnish proper starters for the equipment as furnished at no additional cost to the Owner.
- F. Conduits and wires where shown on the Drawings are for bidding purposes. Electrical Contractor shall verify all wire sizes, number of wires required and supply the proper number to each piece of equipment before installation. Current carrying conductors are shown on drawings. Contractor to provide neutral and grounding conductors as required by code.

3.05 NAMEPLATES

- C. As completed conduit runs are installed, rod and draw through test mandrel. Plug conduit after testing to prevent entry of foreign material.

3.05 COLOR CODING

- A. Provide color bands one inch wide for all conduits, applied at panel and pullbox. Locations within each room and 50 feet on centers within an area.
- B. Color Banding:
 - 1. 120/208 volt: Gray
 - 2. 460 volt: Sand
 - 3. Telephone: Blue
 - 4. Low Voltage: Black
 - 5. Control: Yellow

3.06 CONDUIT INSTALLATION HAZARDOUS AREAS

- A. Conduit installation shall comply in all respects with the requirements of NEC for respective Class, Division, Group installation. Conduit shall be threaded rigid type. Where flexible connections are necessary such as connections to motors, light fixtures, etc., flexible connections shall be explosion-proof.
- B. All boxes, fittings and joints shall be threaded for connection to the conduit.
- C. Threaded joints shall be made up of at least five threads fully engaged as described by NEC.
- D. Seals shall be provided as required by NEC in each conduit entering an arcing device within 18" of device, in conduits entering an enclosure, and in conduit runs leaving a hazardous area. Seals shall be fitted with the proper compound approved for the purpose and as recommended by the manufacturer.
- E. Run conduits vertically wherever possible to avoid use of horizontal seals. Where conduit is to be run horizontally, provide junction boxes in horizontal run and sealed risers to devices, rather than connecting directly between the devices.
- F. Conduits in concrete slab shall be considered within the hazardous area.

END OF SECTION

SECTION 16120

CONDUCTORS
600 VOLT OR LESS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01340: Shop Drawings
- B. Section 16010: Electrical Special Conditions
- C. Section 16100: Basic Scheduled Material
- D. Section 16111: Conduits

1.02 DESCRIPTION

- A. The work required under this Section includes, but is not limited to, the provision and installation of all wire and cable 600 volt and under required for the work.
- B. This Section covers all wire and cable 600 volt and under to be used on the various portions of the work and the Electrical Contractor shall meet the requirements of these specifications wherever applicable.

1.03 SUBMITTALS

- A. Submit shop drawings for all products to be used on project.
- B. Samples:
 - 1. Submit, in compliance with Division 1, a minimum of 1-foot length of each type of wire proposed for use on the Project. Samples shall show all markings, including names of manufacturer, wire size, insulation type, and insulation rating.

PART 2 PRODUCTS

2.01 WIRE AND CABLE - 600 VOLT OR LESS

- A. The circular mill area and insulating walls for all wires and cable shall conform in thickness and size to latest requirements of National Electrical Code or 600 volt operation. No wires smaller than No. 12 shall be installed unless specifically designated.
- B. Conductors shall be soft drawn Lake Copper. Conductivity of wire shall not be less than 98%.
- C. Types of insulation and use shall be as follows, unless specifically indicated otherwise on the Drawings or in the Specifications.

1. Power and control wires No. 10 AWG and smaller shall be Type THHN/THWN or XHHW rated at 90°C for dry locations and 75°C for wet locations.
 2. Power and control wires No. 8 AWG and larger shall be Type THHN/THWN or XHHW, both rated at 90°C for dry locations and 75° for wet locations.
 3. Wire and cable shall be as manufactured by General Electric, General Cable, Okonite, Equal offered mfg.
 4. Pull wire in conduits: TW.
 5. Wiring for direct burial shall be Type UF.
- D. Conductors size No. 8 and larger shall be stranded; smaller than No. 8 shall be solid.

2.02 WIRE TAGS

- A. Main and feeder cables shall be tagged in all pull boxes, wireways and wiring gutters of the panels. Tags shall identify wire or cable number and/or equipment served as shown on the drawings. Tags shall be metal or of flame resistive adhesive material.

2.03 CABLE LUGS AND TAPS

- A. For conductor sizes No. 8 or smaller: Compression type. Thomas & Betts Stakon; Burndy Hydent; Buchanan Pressure; or approved equal.
- B. For conductors larger than No. 8: Compression type. Thomas & Betts Lugit; Burndy Quicklug; Penn Union Ez; or approved equal.
- C. Connectors to all motors shall be compression indent type suitable for feeder and motor conductors.

2.04 CABLE SUPPORTS IN RISERS

- A. Provide clamping devices employing insulating wedges at code required locations or as indicated on the Drawings or in the Specifications.

2.05 WIRE CONNECTORS

- A. Connectors used to connect fixtures to circuits shall be screw-on spring type connectors with flexible plastic jacket. Scotchlok, Ideal Wing-Nut; Equal offered Mfg.; wire No. 10 AWG and smaller.
- B. All other wiring connectors shall be compression type couplings.

2.06 PULLING CABLES

- A. Steel conduit: nylon or steel
 B. PVC conduit: nylon

PART 3 EXECUTION

3.01 INSTALLATION

- A. Run all wire in conduit, unless otherwise indicated on the Drawings, or directed by the Engineer.
- B. Run all wires of the same circuit in the same conduit.
- C. No wire shall be pulled until conduit installation is complete, clean and dry.
- D. Do not pull thermoplastic wire at temperatures lower than 33 degrees F.
- E. Use pull-in compound (Wire-Lube, Y-Er-Ease, or approved equal) to facilitate pulling of wire. Grease or oil not permitted.
- F. Splice and connect wires only in readily accessible boxes.
- G. Outdoor conduit runs shall be at least 36" below finished grade.
- H. Train and lace wiring inside equipment and panelboard with plastic wrap for a neat appearance.
- I. Make all spare wires in cabinets or panelboards of adequate length for connections. Terminate with insulating tape and tag.

3.02 WIRES AND CABLES IDENTIFICATION

- A. Color code wires size No. 10 and smaller, as follows:

	<u>208/120V</u>
1. Phase A	Black
2. Phase B	Red
3. Phase C	Blue
4. Neutral	White
5. Ground	Green

- B. Cables larger than No. 6 shall have each phase labeled using Brady labels.
- C. Identify control wires at terminations.
- D. Interlocks installed in one device with power from another device shall be special color coding of yellow tracer on black wire.
- E. Instrumentation wires shall be identified with their tag number.
- F. Tag each spare wire.

3.03 WIRE CONNECTIONS AND DEVICES

- A. Thoroughly clean wires before installing lugs and connectors so that joint will carry full capacity of conductors without perceptible

temperature rise. Use lugs or connectors of sufficient size to enclose all strands of the conductors.

3.04 PULLING CABLES

- A. Insert nylon pulling cables with carbon dioxide, compressed air or vacuum. Use inert pulling compounds free of ingredients harmful to insulation. Do not use grease or oil.

3.05 INSULATION TESTS

- A. Test and record insulation resistance of all motors and circuits except lighting branches. Megger readings must be taken before energizing a circuit or motor. When the insulation resistance tests less than 5,000,000 ohm, the Contractor shall investigate causes and take remedial action to prevent damage to circuits and/or motors. The megger test set shall have voltage rating as indicated below.
 - 1. 125 to 1000V insulation 500V test set
 - 2. 1001 to 7500V insulation 1000V test set
 - 3. Above 7500V insulation 2500V test set
- B. All reports shall be certified and submitted to the Engineer as shop drawings.

END OF SECTION

SECTION 16131

BOXES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 16010: Electrical Special Conditions
- B. Section 16100: Basic Scheduled Material
- C. Section 16140: Wiring Devices

1.02 DESCRIPTION

- A. The work required under this Section includes, but is not limited to, the furnishing and installing of all outlet and junction boxes required for the work.
- B. This Section covers all outlet and junction boxes to be used on the various portions of the work and the Electrical Contractor shall meet the requirements of these specifications wherever applicable.

1.03 REFERENCES

- A. NECA - Standard of Installation.
- B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- C. NEMA OS 1 - Sheet steel Outlet Boxes, Device Boxes, Covers and Box Supports.
- D. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- E. NEMA 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).
- F. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS FOR CLOSEOUT

- A. Section 01700 - Contract Closeout: Submittals for Project Closeout.
- B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA - 70.
- B. Provide documents listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 OUTLET BOXES - FOR OFFICES OR SIMILAR FINISHED AREAS

- A. General: Stamped steel, code gauge, galvanized.
- B. In masonry or Tile Walls: rectangular boxes without external ears and with square corners or 4" outlet boxes with raised covers having square corners.
- C. Wall Brackets: With fixture stud, except where box accommodates lampholder only.

2.02 OUTLET BOXES - GENERAL USE

- A. General: Cast conduit type outlet boxes shall be used in all areas except as permitted in 2.01 above.
- B. Boxes shall be surface mounted single or multiple ganged, as required.
- C. Outdoor areas and room areas subject to washdown shall be weatherproof with dust covers and spring lids.
- D. Outlet boxes shall be F.S. or F.D. as manufactured by Crouse-Hinds, Appleton, Killark; or approved equal.
- E. Special purpose outlets shall be furnished where standard outlets are not applicable.

2.03 JUNCTION AND PULL BOXES

- A. General:
 1. Provide junction and pull boxes where required by the NEC whether or not indicated on the Drawings.
 2. Locate in accessible locations.
 3. Verify locations in field with the Engineer to avoid interferences.
 4. Size in accordance with the NEC.
- B. Type: Shall be code gauge galvanized sheet steel or heavy gauge sheet aluminum.
- C. Outdoor type and areas subject to washdown to be NEMA 4 cast aluminum or stainless steel and shall be gasketed. To be provided at 150' intervals on all conduit runs.
- D. Covers: Shall be screw attached type.

2.04 COVERS - ALL BOXES

- A. Covers on all boxes, junction boxes, condulets, (any removable cover in a wireway system) shall be stainless steel or cast aluminum and shall be gasketed.

- B. All screws for covers shall be stainless steel and captive.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation".
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.
- E. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.
- F. Maintain headroom and present neat mechanical appearance.
- G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- I. Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.
- J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- K. Locate outlet boxes to allow luminaries positioned as shown on reflected ceiling plan.
- L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- M. Use flush mounting outlet box in finished areas.
- N. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- O. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.

- P. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
 - Q. Use stamped steel bridges to fasten flush mounting outlet box between studs.
 - R. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
 - S. Use adjustable steel channel fasteners for hung ceiling outlet box.
 - T. Do not fasten boxes to ceiling support wires.
 - U. Support boxes independently of conduit.
 - V. Use gang box where more than one device is mounted together. Do not use sectional box.
 - W. Use gang box with plaster ring for single device outlets.
 - X. Maintain symmetry of all outlets as closely as possible within the Architectural Section contained. For example, center a light fixture over a doorway, or a receptacle in a section of masonry wall, if shown in that approximate position. If the receptacle is shown in the same location as counter or bench, determine the counter's top height and set the receptacle to clear the top and trim of the counter and render the outlet easily accessible.
 - Y. Locate light switches on the latch side of the door. Verify door hinge location in the field prior to the switch outlet installation.
 - Z. Protect devices on outlets in locations where outlets are subject to injury, by means of wire guards or other approved means of protection.
 - AA. Cap all outlets not used under this contract with blank outlet covers.
 - BB. Install weatherproof outlet boxes, covers and trim as designated on the Drawings or specified.
 - CC. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
- 3.02 INTERFACE WITH OTHER PRODUCTS
- A. Coordinate installation of outlet box for equipment connected under Section 16180.
- 3.03 HEIGHTS OF OUTLETS (Heights given are to center of outlet).
- A. Generally as follows:
 - 1. Receptacles over workbenches, tables, etc., except as indicated: 4'-2".
 - 2. Receptacles, general: 1'-6".

3. Telephone outlets over workbenches, tables, etc., except as indicated: 4'-2".
4. Telephone outlets, offices: 1'6".
5. Telephone outlets, general: 1'-6".
6. Wall switches, general: 4'-2".
7. Wall pushbuttons: 4'-2".
8. Motor controllers, 4'-2".
9. Clocks: 7'-0".

B. Exceptions:

1. At junction of different materials in wall finishes.
2. Where outlets would occur in moldings, break in wall surface or unsuitable location in tile, wood, or similar finish.
3. Where outlets would conflict with locations of wall mounted equipment, such as radiators, convectors, unit heaters and the like.

3.04 JUNCTION AND PULL BOX INSTALLATION

- A. Provide pull boxes wherever necessary to facilitate pulling of wire and as indicated.
- B. Locate junction and pull boxes as approved, generally not exposed in finished space, unless otherwise indicated. Where necessary, reroute conduit or make other arrangements for concealments as approved.
- C. Covers shall be accessible.
- D. Splicing boxes for fixtures, recessed in hung ceilings to be accessible through opening created by the removal of fixtures.

END OF SECTION

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SECTION 16140

WIRING DEVICES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 16010: Electrical Special Conditions
- B. Section 16100: Basic Scheduled Material

1.02 DESCRIPTION

- A. The work required under this Section includes, but is not limited to, the furnishing and installation of all wiring devices required for the work.
- B. This Section covers all wiring devices to be used for the various portions of the work and the Electrical Contractor shall meet the requirements of these specifications wherever applicable.

1.03 REFERENCES

- A. NECA - Standard of Installation.
- B. NEMA WD 1 - General Requirements for Wiring Devices.
- C. NEMA WD 6 - Wiring Device - Dimensional Requirements.
- D. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS FOR REVIEW

- A. Do not request submittals if drawings sufficiently describe the products of this section if proprietary specifying techniques are used. The review of submittals increases the possibility of unintended variations to drawings, thereby increasing the Specifier's liability.

The following submittals are intended for review and responsive action by the Architect/Engineer.

- B. Section 01300 - Submittals: Procedures for submittals.
- D. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

PART 2 PRODUCTS

2.01 TOGGLE SWITCHES

- A. 120 - 277 Volt AC 15 and 20 amp

1.	Arrow Hart	1891	1991
2.	Bryant	4801	4901
3.	Hubbell	1201	1221
4.	Pass & Seymour	15AC1	20AC1

2.02 RECEPTACLES, PLUGS AND CONNECTORS

A. 125 Volt, 20 Amp, 2 Pole, 3 Wire Grounding

NEMA Config.	5-20R	5-20P	5-20R
Manufacturer	Receptacle		Plug
1. Arrow Hart	5735S	6766	6769
2. Bryant	5362	5366M	5369N
3. Hubbell	5362	5366C	5369C
4. Pass & Seymour	5352	SS9806	SS9805

B. 125 Volt, 30 Amp, 2 pole, 3 Wire Grounding

NEMA Config.	5-30R	5-30R	5-30R
Manufacturer	Receptacle		Plug
1. Arrow Hart	5716	5717	6716
2. Bryant	9530FR	9530RP	
3. Hubbell	9308	9309	
4. Pass & Seymour	5920	5921	

C. 125 Volt, 50 Amp, 3 Pole, 3 Wire Grounding

NEMA Config.	5-5-R	5-50P	
Manufacturer	Receptacle		Plug
1. Arrow Hart	5711		5712
2. Bryant	9550FR		9550
3. Hubbell	9360		9361
4. Pass & Seymour	5940		5951

D. 250 Volt, 20 Amp, 2 Pole, 3 Wire Grounding

NEMA CONFIG.	10-30r	
Manufacturer	Receptacle	
1. Arrow Hart	9344	
2. Hubbell	9350	
3. Pass & Seymour	3853	

2.03 WEATHERPROOF RECEPTACLES

- A. Receptacles for weatherproof type outlets to be equipped with gasket, die-cast hinged lid and corrosion resistant type plate or PVC as called for. Hubbell 5210; Arrow Hart 5769; or approved equal.

2.04 COLOR OF WIRING DEVICES

- A. All wiring devices in finished areas shall be ivory plastic, and ivory finished devices corresponding to the catalog numbers shown on the Contract Documents.2.05

2.05 DEVICE PLATES

- A. Finished Areas: Heavy duty brushed stainless steel, type 302 Brushed finish shall extend to edges of plate including beveled surfaces.
- B. Rest Rooms and Locker Rooms: Chromium plated over brass.
- C. High Moisture and Corrosive Areas: Non-metallic nylon type.
- D. Provide weather tight PVC lever operated covers where called for and in outside locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that outlet boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.03 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- E. Do not share neutral conductor on load side of dimmers.
- F. Install receptacles with grounding pole on bottom.
- G. Connect wiring device grounding terminal to outlet box with bonding jumper or branch circuit equipment grounding conductor.
- H. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- I. Connect wiring devices by wrapping conductor around screw terminal.

- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights shown or specified are compatible with the Americans with Disabilities Act (ADA) and other regulations.

3.05 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING

- A. Section 01700 - Project Closeout
- B. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

- A. Section 01700 - Project Closeout: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 16180

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Specified Herein and Elsewhere

1. Circuit breakers
2. Fuses

1.02 RELATED WORK

A. Shop Drawings and Product Data

1. Submit shop drawings and product data for the products of this Section in compliance with Section 01340.
2. Submit fuse and circuit breaker time/current characteristic curves, on standard size sheets, for each type and size of overcurrent protective device proposed for use on the Project.

PART 2 PRODUCTS

2.01 CIRCUIT BREAKERS

A. General Requirements:

1. All Circuit Breakers shall be UL. Listed.
2. Circuit Breakers shall be as manufactured by Square D, General Electric, or approved equal.

B. Unless otherwise indicated elsewhere in the Specifications or on the Drawings, the following shall govern:

1. Circuit breakers up to 500A shall be molded case thermal magnetic type.
2. Circuit breakers greater than 500A shall be molded case solid state trip type. Square D Micrologic with ground fault.
3. Interrupting current ratings shall be as indicated in the following table:

<u>Type of Service</u>	<u>Frame Size (Amps)</u>	<u>Interrupting Ratings*</u>
a. 120/208 Vac	Thru 100	10,000 AIC**
b. 120/208 Vac	225	22,000 AIC
c. 120/208 Vac	400	42,000 AIC
d. 120/208 Vac	600	42,000 AIC
e. 480 Vac		65,000 AIC

*Values shown are at rated supply voltage.

**AIC - Amperes Interrupting Capacity

C. Molded Case Thermal Magnetic Circuit Breaker

1. Breakers covered under this specification include those applied in switchboards, panelboards, motor control centers, combination motor starters, busway plug-in units and individual enclosures.
2. Molded case circuit breakers shall have overcenter, trip-free, toggle-type operating mechanisms with quick-make, quick-break action and positive handle indication. Two and three-pole breakers shall be common trip. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. The circuit breaker shall be constructed to accommodate the supply connections at either end. Circuit breaker operating handles shall assume a center position when tripped. All breakers shall be calibrated for operation in an ambient temperature of 40°C. Circuit breakers shall be suitable for mounting and operating in any position.
3. Breakers shall have removable lugs. Lugs shall be UL Listed for copper only conductors. Breakers shall be UL Listed for installation of crimp lugs.

D. Solid State Trip Circuit Breakers

1. General: This specification covers Solid State Trip Circuit Breakers rated 225 through 2000 amperes, 480 volt, AC. All circuit breakers shall be UL Listed and meet NEMA Standard No. AB1-1975 and Federal Specification No. W-C-375B-GEN when applicable. Breakers covered under this specification may be installed in panelboards, switchboards or individual enclosures.
2. Construction: Solid State Trip Circuit Breakers shall be quick-make and quick-break type. They shall have wiping type contacts and be provided with arc chutes. Two and three-pole breakers shall be designed for operation in an ambient temperature of 40° C. Each Solid State Trip Circuit Breaker shall have trip indication by handle position and shall be trip free. The ampere rating of the Solid State Trip Circuit Breaker shall be determined by the rating plug. Solid State Trip Circuit Breakers shall have highly reliable electronic components to measure and time the output from internal current monitors and initiate automatic tripping action. The Solid State Trip Circuit Breakers shall be constructed to accommodate the supply connections at either end of the circuit breaker. A button shall be provided on the cover for mechanically tripping the circuit breaker. Circuit breakers shall be suitable for mounting and operating in any position.
3. Adjustments: Solid State Trip Circuit Breakers shall have separate adjustments for the ampere setting 70%, 80%, 90%, or 100% of the rating plug and short time pickup trip setting 200%, 400%, 500%, or 600% of the ampere setting. Instantaneous operation shall occur on overcurrents greater than 900% of the ampere setting.
4. Equipment Ground Fault Protection, as called for on plans: Solid State Trip Circuit Breakers shall have integral 3-phase, 3-wire equipment ground fault protection. An external neutral CT shall be provided for 3-phase, 4-wire systems. The ground fault current trip point shall be 40% of the rating plug with time delay selections at .1, .2, .3, and .5 seconds for system coordination.

Each Solid State Trip Circuit Breaker with ground fault protection shall include ground fault trip indication.

5. Testing: A battery powered test kit to simulate overcurrent and ground fault conditions shall be provided by the Contractor.
6. Terminations: Solid State Trip Circuit Breakers shall have removable lugs. Lugs shall be UL Listed for copper and aluminum conductors. Breakers shall be UL Listed for installation of mechanical screw type lugs.
7. Solid State Trip Circuit Breakers shall be Square D ME or PE, or approved equal, circuit breakers as indicated on the drawings.

2.02 FUSES

- A. Fuses for above 600 amps shall be UL Class L current limiting type with 200,000 amp interrupting capacity and for second time delay at 500% rating. Fuses above 600 amp rating shall be Buss HiCap KRP-C; Gould-Shawmut Amptrap Form 480; Reliance LCL; or approved equal.
- B. Fuses for above 150 amps up through 600 amps shall be UL Class RK-5 dual element current limiting type with 200,000 amp interrupting capacity and 10 second delay at 500% rating. Fuses rated above 150 through 600 amps shall be Buss Low Peak; Gould-Shawmut Tri-Onic; Reliance ECNR; or approved equal.
- C. Fuses for 150 amps and below shall be UL Class RK-1 current limiting silver link type with minimum time delay and 200,000 amp interrupting capacity. Fuses 150 amps and below shall be Buss Limitron; Gould-Shawmut Amptrap; Reliance NCLR; approved equal.
- D. Fuses for motor circuits shall be dual element type with 200,000 amp interrupting capacity. Fuses for motor circuits shall be Buss Fusetron; Gould-Shawmut Dual Element; approved equal.

2.03 PANELBOARD OVERCURRENT PROTECTIVE DEVICE

- A. The Main Overcurrent Protective Device in or ahead of the Panelboard shall have current limiting capabilities to limit the Short Circuit in the panelboard to less than 10,000 amperes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install overcurrent protective devices in compliance with the manufacturer's instructions.
- B. Circuit Breakers:
 1. Do not install 2 poles in a single module.
 2. Install multi-pole breakers with a single handle. Do not install external mechanical ties between single pole breakers.

END OF SECTION

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SECTION 16190
SUPPORTING DEVICES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 16010: Electrical Special Conditions
- B. Section 16450: Grounding

1.02 DESCRIPTION

- A. The work under this Section includes, but is not limited to, the furnishing and installing of all racks and supports for the mounting of electrical equipment required for the work.

1.03 CONTRACT DOCUMENTS

- A. The Electrical Contractor shall furnish and install proper racks and supports as required to mount all starters, motor control devices, push buttons, convenience outlets and other miscellaneous electrical components.
- B. The Electrical Contractor shall mount all electrical components in a uniform method, as specified under all of the various portions of the work.

1.04 REFERENCES

- A. NECA - National Electrical Contractors Association
- B. ANSI/NFPA 70 - National Electrical Code

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.

PART 2 PRODUCTS

2.01 MATERIAL

- A. The Electrical Contractor shall use steel rolled structural shapes, flat plate 1/8" thick, and steel rods for all racks and supports unless shown otherwise on the Contract Documents. All materials shall be hot dipped galvanized.

2.02 ATTACHMENTS

- A. Racks shall not be attached to equipment, equipment bases, or housekeeping pads. Racks shall be free standing from such equipment.
- B. Racks shall have supports of rolled channel sections and where subject to moisture shall be isolated from concrete floors or walls by neoprene pad.
- C. Attachment to structural members or floors shall be by expansion shields.

2.03 SUPPORTING STRUCTURES

- A. Racks shall be supported from floor using channel sections with a minimum size of 3" x 1-1/2".
- B. Adequate feet shall be provided to allow secure mounting.
- C. All sections shall be welded.

2.04 MOUNTING PANELS

- A. Mounting panels shall be sized to adequately mount all necessary equipment, shall be not less than 1/8" steel plate.
- B. Mounting panels shall not exceed sixty (60) inches to top from floor.
- C. Mounting panels shall be uniform sizes as far as practical. Preferred sizes being 12" x 18", 18" x 24", 18" x 30", and 24" x 30.

2.05 CONDUIT SUPPORTS

- A. Conduit supports shall be provided, as required, using structural rolled sections or continuous slot channels.

2.06 PLATFORMS

- A. Platforms for heavy electrical equipment shall be constructed of structural rolled steel shapes and with checkered steel plates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All items shall be installed in best field practice in general conformance to NECA installation standards and these Specifications.
- B. Any field cuts or abrasions of the galvanized surfaces shall be primed with at least 2 coats of zinc primer containing a high percentage of zinc dust.

END OF SECTION

SECTION 16421

UTILITY SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Arrangement with Utility Company for permanent electric service, including payment of Utility Company charges for service.
- B. Underground service entrance.
- C. Metering equipment.

1.02 RELATED SECTIONS

- A. Section 02215 - Excavating
- B. Section 02220 - Backfilling
- C. Section 02221 - Trenching
- D. Section 03300 - Cast-in-Place Concrete
- E. Section 16111 - Conduit
- F. Section 16450 - Grounding and Bonding

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.04 SYSTEM DESCRIPTION

- A. System Characteristics: As shown on the plans.
- B. Service Entrance: Service entrance shall run from utility transformer to service meter and shall include all metering requirements, conduits, wires, mounting, etc. of the power company.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document on site.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.

- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.08 PRE-INSTALLATION CONFERENCE

- A. Convene three (3) weeks prior to commencing work of this Section.

1.09 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated and correct as needed.

PART 2 PRODUCTS

2.01 UTILITY METERS

- A. Meters will be furnished by Utility Company.

2.02 COMPONENTS

- A. Conduit: See Section 16111.
- B. Concrete: 3,000 psi (20.7 MPa) with additive to give permanent red color, 3/4 inch maximum aggregate size. See Section 03300.
- C. Markers: Square with 12-14 in. letters reading DANGER HIGH VOLTAGE MAIN ENTRANCE.
- D. Conductors: See Section 16120.
- E. Cable Lugs: Suitable for the application.
- F. Drainage Assembly: Provide 1/2 in. (12.7 mm) drain assembly. Drain for each conduit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Terminate service conduit in main panel with grounding bushing. Make #3/0 AWG ground connection from bushing to distribution center ground bus.

END OF SECTION

SECTION 16450

GROUNDING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01340: Shop Drawings
- B. Section 16010: Electrical Special Conditions
- C. Section 16100: Basic Scheduled Materials

1.02 DESCRIPTION

- A. The work under this Section includes, but is not limited to, furnishing and installing all grounding required for the work.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Ground Rod: 3/4" x 10'-0" copperweld ground rod.
- B. Ground Conductor: Bare copper conductor as required by the NEC. Minimum size to be #4/0 in ground network, or as indicated on the Drawings.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Entire installation to be grounded in accordance with the requirements of the NEC, and as indicated on the Drawings or specified.
- B. Resistance to ground at any point shall not measure more than 5.0 ohms.
- C. Ground system tests shall be performed and test reports shall be certified. Furnish Test Reports to the Engineer as Shop Drawings.
- D. Connection of cables to rods or cable to cable shall be thermite reaction welding system employing copper oxide and aluminum power reaction to melt and fuse copper conductors into welded connections.
- E. No connections shall be covered before inspection by the Engineer.
- F. Frames of all motors shall be properly grounded using grounding conductor installed inside of, or grounding jumpers installed around, final flexible conduit connections.

- G. Ground system meter testing shall be completed prior to the connection to the Grounding System to its associated Electrical Equipment.
- H. No Electrical Equipment shall be energized prior to the testing of its associated Grounding System.

END OF SECTION