A. L. FRANKS ENGINEERING

118 East Broad Street
Texarkana, AR 71854
PHONE 870.216.1906 • FAX 870.216.1907

June 20, 2019

Ms. Bailey Taylor
Water Division, Enforcement Analyst
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

Re: City of Magnolia, AR
AFIN: 14-00059 NPDES Permit No. AR0043613
Certificate of Adequacy of Treatment

Dear Ms. Taylor:

Please find transmitter herewith one (1) copy of the plans and specifications for the automatic chemical feed project for the Magnolia Waste Water Treatment Plant. The project was bid in the spring of 2018 and placed in service in September of 2018 and includes the automatic dosing of caustic soda for pH adjustment. The 1989 original design of the plant included the ability for pH adjustment. Prior to this improvement, the Utility was adjusting pH manually with little consistency. I have also included a Safety Data Sheet (SDS) for caustic soda for your reverence.

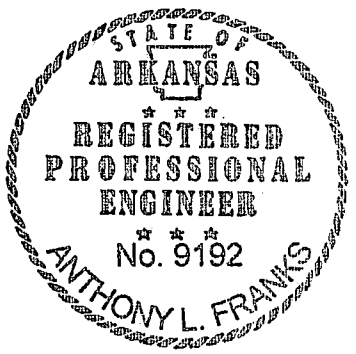
The dosing is controlled by an electronic signal from a 4-20 milli-amp probe that initiates the chemical feed pump at a pH of 6.5. Should influent pH drop to 6.2, the pump begins to operate at 100% until the pH returns to greater than 6.5. The maximum pump rate is 158 gallons per hour and the average volume of caustic soda used is approximately 30 gallons per month. Since the automated feed system was placed in service there was one pH excursion in December of 2018 which was due to excessive rainfall and documented in a non-compliance report.

In my assessment, this automatic chemical feed system is performing as designed and adequately adjusting pH to allow proper performance of the treatment facility.

Sincerely,

A. L. FRANKS ENGINEERING, INC.

Anthony L. (Andy) Franks, P.E.
President/CEO



CC: Mayor Parnell Vann
Russell Thomas, Magnolia Waste Water

3-30-17

Safety Data Sheet

7215 Highway 271 South
Fort Smith, Arkansas 72908
479-649-7447— Fax 479-649-7557
cleanwater@watertechinc.net

Certified to NSF/ANSI 60

In Case of Emergency, contact Chemtrec 1-800-424-9300

1) Product Identification

WTM-CS50 Caustic Soda, 50% (Sodium Hydroxide, 50%)

Synonyms: Sodium hydroxide solution, liquid caustic soda, sodium hydroxide, lye solution, soda lye, caustic soda solution.

2) Hazards Identification

Signal Word: DANGER

Hazard Statements

H290	May be corrosive to metals.
H318	Causes serious eye damage.
H314	Causes severe skin burns and eye damage.
H370	Causes damage to organs (respiratory system by inhalation)

Precautionary Statements

P234	Keep only in original container.
P260	Do not breathe dusts or mists.
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink, or smoke when using this product.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301+330+331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+361+353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304+340	IF INHALED: Remove victim to fresh air and keep comfortable for breathing.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+311	If exposed or concerned: Call a doctor.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P405	Store locked up.
P406	Store in corrosive resistant container with a resistant inner liner.
P501	Dispose of contents/container in accordance with specified local/regional/national regulations for disposal.

POTENTIAL HEALTH EFFECTS

Inhalation: May cause irritation (possibly severe), chemical burns, and pulmonary edema.

Skin Contact: May cause irritation (possibly severe) and chemical burns.

Eye Contact: May cause irritation (possibly severe), chemical burns, eye damage, and blindness.

Ingestion: May cause irritation (possibly severe), chemical burns, nausea and vomiting.

Target Organs Effected: Respiratory System, Skin, Eye

Medical Conditions Aggravated by Exposure: Asthma, respiratory disorders

3) Information on Ingredients

Component	CAS #	% by Weight
Sodium Hydroxide	1310-73-2	48-52
Water	7732-18-5	48-52
Sodium Chloride	7647-14-5	1-2%

4) First Aid Measures

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation/Automatic External Defibrillator) and call for emergency services immediately.

Skin Contact: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Wash contaminated areas with soap and water. Thoroughly clean and dry contaminated clothing before reuse. Discard contaminated leather goods. Get medical attention immediately.

Eye Contact: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation f all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. Get medical attention immediately.

Ingestion: Never give anything by mouth to an unconscious or convulsive person. If swallowed, do not induce vomiting. Give large amounts of water. If vomiting occurs spontaneously, keep airway clear. Give more water when vomiting stops. Get medical attention immediately.

Notes to Physician: The absence of visible signs or symptoms of burns does NOT reliably exclude the presence of actual tissue damage. Probable mucosal damage may contraindicate the use of gastric lavage.

5) Fire and Explosion Data/Fire Fighting Measures

Fire Hazard: Negligible fire hazard.

Extinguishing Media: Use media appropriate for surrounding fire

Firefighting: Move container from fire area if it can be done without risk. Cool containers with water. Avoid contact with skin.

Sensitivity to Mechanical Impact: Not sensitive.

Sensitivity to Static Discharge: Not sensitive.

Flash Point: Not flammable.

6) Accidental Release Measures

Wear appropriate personal protective equipment recommended in Section 8 of this SDS. Completely contain spilled material with dikes, sandbags, etc. Shovel dry material into suitable container. Liquid material may be removed with a vacuum truck. Remaining material may be diluted with water and neutralized with dilute acid, then absorbed and collected. Flush spill area with water, if appropriate. Keep product and flush water out of water supplies and sewers. This material is alkaline and may raise the pH of surface waters with low buffering capacity. Release should be reported, if required, to appropriate agencies.

7) Handling and Storage

Handling: Avoid breathing vapor or mist. Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. When mixing, slowly add to water to minimize heat generation and spattering.

Storage: Store and handle in accordance with all current regulations and standards. Keep container tightly closed and properly labeled. Do not store in aluminum container or use aluminum fittings or transfer lines, as flammable hydrogen gas may be generated. Keep separated from incompatible substances.

8) Exposure Controls and Personal Protection

Exposure Limits

Component	CAS #	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling	Immediately Dangerous to Life and Health (IDLH)
Sodium hydroxide	1310-73-2	2mg/m3	—	—	10mg/m^3

Engineering Controls: Provide local exhaust ventilation where dust or mist may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye Protection: Wear chemical safety goggles with a face shield to protect against eye and skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear chemical resistant clothing and rubber boots when potential for contact with the material exists. Contaminated clothing should be removed, then discarded or laundered.

Hand Protection: Wear appropriate chemical resistant gloves.

Protective Material Types: Natural rubber, Neoprene, Nitrile

Respiratory Protection: A NIOSH-approved respirator with N95 (dust, fume, mist) cartridges may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits, or when symptoms have been observed that are indicative of overexposure. If eye irritation occurs, a full face style mask should be used. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

9) Physical and Chemical Properties

Appearance:	Clear, colorless to slightly colored liquid
Odor:	Odorless
Boiling Point/Range:	230-291°F (110-144°C)
Freezing Point/Range:	-26-59°F (-32-15°C)
Vapor Pressure:	13-135mmHg @ 60°C
Vapor Density (air = 1):	No data available
Specific Gravity (water = 1):	1.11-1.53 @ 15.6°C
Water Solubility:	100%
pH:	14.0 (7.5% solution)
Volatility:	No data available
Evaporation Rate (ether = 1):	No data available
Partition Coefficient (n-octanol/water):	No data available

10) Stability and Reactivity

Stability: Stable at normal temperatures and pressures.

Conditions to Avoid: Mixing with water, acid, or incompatible materials may cause splattering and release large amounts of heat, Will react with some metals forming flammable hydrogen gas. Carbon monoxide gas may form upon contact with reducing sugars, food and beverage products in enclosed spaces.

Incompatibilities (Materials to Avoid): Acids, halogenated compounds, prolonged contact with aluminum, brass, bronze, copper, lead, tin, zinc or other alkali sensitive metals or alloys.

Hazardous Decomposition Products: Toxic fumes of sodium oxide.

Hazardous Polymerization: Will not occur

11) Toxicological Information

Component	LD50 Oral	LC50 Inhalation	LD50 Dermal
Sodium hydroxide	Not listed	Not listed	1350mg/kg (rabbit)
Sodium chloride	3g/kg (rat)	42g/m3 (1-hr Rat)	10g/kg (rabbit)

Toxicity: The severity of the tissue damage is a function of its concentration, the length of tissue contact time, and local tissue conditions. After exposure there may be a time delay before irritation and other effects occur. This material is a strong irritant and is corrosive to the skin, eyes and mucous membranes. This material may cause severe burns and permanent damage to any tissue with which it comes into contact. Inhalation will cause severe irritation, possible burns with pulmonary edema, which may lead to pneumonitis. Skin contact with this material may cause severe irritation and corrosion of tissue. Repeated exposure may cause dermatitis. Eye contact can cause severe irritation, corrosion with possible corneal damage and blindness. Ingestion may cause irritation, corrosion/ulceration, nausea, and vomiting.

Carcinogenicity: This product is not classified as a carcinogen by NTP, IARC or OSHA.

12) Ecological Information

Aquatic Toxicity: This material has exhibited moderate toxicity to aquatic organisms. Data provided are for sodium hydroxide.

Freshwater Fish Data
LC50 brook trout: 25ppm/24 hr
LC50 king salmon: 48ppm

Invertebrate Toxicity Data
EC50 daphnia magna: 100ppm
EC50 shrimp: 33-100ppm/48 hr
EC50 cockle: 330-1000ppm/48 hr

Biodegradation: This material is inorganic and not subject to biodegradation.

Persistence: This material is alkaline and may raise the pH of surface waters with low buffering capacity. This material is believed to exist in the disassociated state in the environment.

Bioconcentration: This material is not expected to bioconcentrate in organisms.

Additional Ecological Information: This material has exhibited slight toxicity to terrestrial organisms.

13) Disposal Considerations

Reuse or reprocess, if possible. Dispose of in accordance with all applicable regulations. May be subject to disposal regulations: U.S. EPA 40 CFR 261. Hazardous Waste Number: D002

14) Transport Information

US DOT

Proper Shipping Name: Sodium Hydroxide Solution
UN Identification: UN1824
Hazard Class: 8
Packing Group: II
Labeling Requirements: 8 (Corrosive)
DOT Reportable Quantity: 1000lbs (Sodium Hydroxide)

Canadian Transportation of Dangerous Goods

Proper Shipping Name: Sodium Hydroxide Solution
UN Identification: UN1824
Hazard Class: 8
Packing Group: II

15) Regulations

OSHA Regulatory Status: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200.)

CERCLA Sections 102a/103 Hazardous Substances (40 CFR 302.4): If a release is reportable under CERCLA Section 103, notify the state emergency response commission and local emergency planning committee. In addition, notify the National Response Center at 1-800-424-8802 or (202) 426-2675.

Sodium Hydroxide
CERCLA Reportable Quantity: 1000 lb (final RQ)

EPCRA Extremely Hazardous Substances (40 CFR 355.30): No components are listed.

EPCRA Section 313 (40 CFR 372.65): No components are listed.

OSHA Process Safety (29 CFR 1910.119): Not regulated

TSCA: All components are listed or exempt.

TSCA 12(b): This product is not subject to export notification.

Canadian Domestic Substance List (DSL/NDSL): All components of this product are listed on either the DSL or NDSL.

California Proposition 65: This product is not listed, but it may contain impurities known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act.

California Proposition 65 Cancer WARNING	Not listed
California Proposition 65 CRT List—Male Reproductive Toxin	Not listed
California Proposition 65 CRT List—Female Reproductive Toxin	Not listed
Massachusetts Right to Know Hazardous Substance List	Listed
New Jersey Right to Know Hazardous Substance List	Listed
New Jersey Special Health Hazards Substance List	Listed
Pennsylvania Right to Know Hazardous Substance List	Listed
Pennsylvania Right to Know Environmental Hazard List	Listed
Rhode Island Right to Know Hazardous Substance List	Listed

Canadian Regulations: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS Classification: E

16) Other Information

HMIS
Health—3
Flammability—0
Reactivity—1
Personal Protection—determined by user

NFPA
Health—3
Flammability—0
Reactivity—1
Special—COR

Date Issued: Wednesday, August 31, 2016
Revision Date: Wednesday, February 10, 2016

Reason for Revision: New product

Revised By: Matt Frederick, EHS Coordinator

CITY OF MAGNOLIA, ARKANSAS

MAGNOLIA WASTEWATER FACILITY

CHEMICAL FEED SYSTEM

PROJECT NO: MG-02-18

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 9192
ANTHONY L. FRANKS

FINAL

COMPLETED FOR BIDDING OR CONSTRUCTION PURPOSES (PLANS / SPECIFICATIONS NOT BEARING THIS NOTE MAY HAVE REVISIONS AND SHOULD NOT BE USED FOR BIDDING OR CONSTRUCTION PURPOSES)

2/28/18
PROJECT ENGINEER / DATE

FEBRUARY 2018

CERTIFICATE OF AUTHORIZATION
A.L. FRANKS ENGINEERING, INC.
No. 1681
ARKANSAS - ENGINEER

A.L. FRANKS ENGINEERING

118 E. Broad Street
Texarkana, Arkansas 71854
(870) 216-1906
FAX (870) 216-1907

101 W. Main St., Ste. 413
El Dorado, AR 71730
(870) 444-5160
FAX (870) 444-5161

CONTRACT DOCUMENTS

CITY OF MAGNOLIA, ARKANSAS
MAGNOLIA WASTEWATER FACILITY
CHEMICAL FEED SYSTEM

TABLE OF CONTENTS

NOTICE TO BIDDERS

Proposals addressed to Mayor Parnell Vann, City of Magnolia, 201 East North Street, Magnolia, AR 71753, will be received until **2:00 P.M., Tuesday, March 27, 2018** for furnishing all labor, equipment, materials, supplies, and supervision necessary to provide and install new Chemical Feed System at the Waste Water Treatment Plant. Bids will be opened and read aloud at such time at City Hall.

The bid package may be examined without charge at Magnolia City Hall. One copy of each set of documents may be purchased from the Engineer for $50.00. No refunds will be made.

Engineer: A.L. Franks Engineering, Inc.
David Stewart, Project Manager
118 E. Broad Street
Texarkana, AR 71854
Phone: (870) 216-1906
Fax: (870) 216-1907
E-mail: dstewart@alfranksengineering.com

An acceptable bid bond in an amount not less than five percent (5%) of the total bid shall accompany each bid as a guaranty that, if awarded the contract, the bidder will promptly enter into contract with the City of Magnolia and furnish bonds on the forms provided.

The successful Bidder will be required to furnish a Performance and Payment Bond, each in the amount of the contract, written by a responsible surety company authorized to do business in the State of Arkansas that is satisfactory to the Owner.

Bidders are expected to inspect the site of the work and to inform themselves of all local conditions. The time of completion shall be **60 calendar days** including Saturdays, Sundays and legal holidays.

The bid award will be based on the bid amount and the performance of the Contractor on past similar projects. Bidders shall complete statement of qualifications.

Bidders are directed to Arkansas Statute 71-701 through 71-720, requiring that bidders have an Arkansas State Contractor's License. Evidence of licensure shall be provided to the Owner prior to award of the project to the lowest, responsible responsive bidder.

The successful bidder will be required to furnish evidence of registration with the State Department of Finance and Administration in compliance with Act 125 of 1965 prior to engaging in the performance of this Contract.

No bid may be withdrawn after the scheduled closing time for receipt of bids for at least 90 calendar days.

The City of Magnolia reserves the right to consider the most advantageous construction thereof, or to reject the bid and the right to reject any or all bids, waive any or all informalities and to award the contract to the bidder or bidders who, in the opinion of the Owner, offers the proposal to the best interest of same.

Qualified bids will be subject to rejection. Any person, firm, or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the Owner.

City of Magnolia, Arkansas

Parnell Vann, Mayor

STATEMENT OF QUALIFICATIONS: _____
Bidder

_____
Address

Similar Projects Completed by Bidder:

1. NAME OF PROJECT: _____

   OWNER: _____ ADDRESS: _____

   DATE STARTED: _____ DATE COMPLETED: _____

   APPROX. QUANTITIES OF MAJOR ITEMS: _____

   _____

   VALUE OF CONTRACT: _____

2. NAME OF PROJECT: _____

   OWNER: _____ ADDRESS: _____

   DATE STARTED: _____ DATE COMPLETED: _____

   APPROX. QUANTITIES OF MAJOR ITEMS: _____

   _____

   VALUE OF CONTRACT: _____

3. NAME OF PROJECT: _____

   OWNER: _____ ADDRESS: _____

   DATE STARTED: _____ DATE COMPLETED: _____

   APPROX. QUANTITIES OF MAJOR ITEMS: _____

   _____

   VALUE OF CONTRACT: _____

4. OTHER PROJECT REFERENCES: _____

   _____

PROPOSAL

TO: Parnell Vann
Mayor

FOR: Magnolia Wastewater Facility
CHEMICAL FEED SYSTEM

The undersigned, as bidder, declares that the only person or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm, or corporation; that he has carefully examined the form of Contract, Notice to Bidders, and Specifications therein referred to, and has carefully examined the locations, conditions and classes of materials of the proposed work; and agrees that he will provide all the necessary labor, machinery, tools, apparatus, and other items incidental to construction, and will do all the work and furnish all the materials called for in the Contract and Specifications in the manner prescribed therein and according to the requirements of the Engineer as therein set forth.

It is further agreed that the quantities of work to be done at unit prices and materials to be furnished may be increased or diminished as may be considered necessary, in the opinion of the Engineer, to complete the work fully as planned and contemplated, and that all quantities of work, whether increased or decreased, are to be performed at the unit prices set forth below except as provided for in the Specifications.

It is further agreed that lump sum prices may be increased to cover additional work ordered by the Engineer, but not required by the Specifications, in accordance with the provisions of the General Conditions. Similarly, they may be decreased to cover deletion of work so ordered.

It is understood and agreed that the work is to be completed in full within **60 calendar days** beginning on the date stated in the work order on which work is to be commenced. The City of Magnolia, AR shall withhold, permanently from the Contractor's total compensation, the sum of Five Hundred Dollars ($500.00) per calendar day for liquidated damages.

Accompanying this proposal is a certified or cashier's check or bid bond, payable to the City of Magnolia, AR for

_____Dollars ($_____).

The bid security accompanying this proposal shall be returned to the bidder, unless in case of the acceptance of the proposal the bidder shall fail to execute a Contract and to file a performance and payment bonds within fifteen days after its acceptance, in which case the bid security shall become the property of the City of Magnolia, AR, and shall be considered as payment for damages due to delay and other inconveniences suffered by the Owner on account of such failure of the bidder.
It is understood that the City of Magnolia, AR reserves the right to reject any and all bids and to waive any informalities in the bidding.

In the event of the award of a Contract to the undersigned, the undersigned will furnish a Performance and Payment Bond each for the full amount of the Contract to secure proper compliance with the terms and provisions of the Contract, to insure and guarantee the work until final completion and acceptance, and to guarantee Payment of all lawful claims for labor performed and materials furnished in the fulfillment of the Contract.

CITY OF MAGNOLIA, ARKANSAS

MAGNOLIA WASTEWATER FACILITY

CHEMICAL FEED SYSTEM

BID PROPOSAL

ITEM	QTY/UNIT	DESCRIPTION	UNIT PRICE	TOTAL PRICE
1.	1 L.S.	Provide and Install all labor, Equipment, Piping, Electrical, Pumps, Alkalinity Analyzer, 275 gallon Caged IBC Caustic Soda Tote and all other appurtenances for a complete and operational Automated Caustic Soda Feed System per plans and specifications for the lump sum price of _____Dollars and _____Cents/L.S.	$XXXXXXX XX	$_____
2.	1 L.S.	Provide and Install 8'x8'x7'-6" Fiberglass Reinforced Building, piping, electrical per plans and specifications for the lump sum price of _____Dollars and _____Cents/L.S.	$XXXXXXXXX	$_____

BID PROPOSAL
(Continued)

ITEM	QTY/UNIT	DESCRIPTION	UNIT PRICE	TOTAL PRICE
3.	81 S.F.	Provide and Install 9'x9' Concrete Foundation with a 5'x8' Concrete Ramp per plans and specifications for the unit price of _____Dollars and _____Cents/S.F.	$_____	$_____
4.	2 EA.	Provide and Install Ultrasonic Flowmeters per plans and specifications for the unit price of _____Dollars and _____Cents/EA.	$_____	$_____
		TOTAL BID		$_____

NOTE:

1. Miscellaneous items, directed work, connections, etc., not specifically listed but required to complete the proposed improvements, shall be included in the Bid under the most appropriate Bid Item.

2. Time required to complete the work shall be 60 calendar days.

The undersigned certifies that the bid prices contained in this proposal have been carefully checked and are submitted as correct and final.

NOTE:--Unit and lump sum prices must be shown in words and in figures for each item listed in this Proposal, and in the event of discrepancy, the words shall control. Should bid prices on any items be omitted, the right is reserved to apply the lowest prices submitted under this Proposal. In the event of discrepancies, the Owner reserves the right to accept or reject informalities.

Receipt is hereby acknowledged of the following addenda to the Contract Documents:

Addendum No. 1 dated_____Rec. via mail_____ Rec. via fax_____
Addendum No. 2 dated_____Rec. via mail_____ Rec. via fax_____
Addendum No. 3 dated_____Rec. via mail_____ Rec. via fax_____
Addendum No. 4 dated_____Rec. via mail_____ Rec. via fax_____
Addendum No. 5 dated_____Rec. via mail_____ Rec. via fax_____

CONTRACTOR:_____

BY:_____

NAME:_____

TITLE:_____

ADDRESS:_____
(Street Address or Physical Address)

MAILING ADDRESS:_____
(P. O. Box)

CITY, COUNTY & STATE:_____

ZIP:_____

TELEPHONE:_____

FAX TELEPHONE:_____

NOTICE OF AWARD

TO: _____
_____
_____

Project Description: Chemical Feed System Improvements
Wastewater Treatment Plant, Magnolia, AR

CHEMICAL FEED STSTEM

The Owner considered the Bid submitted by you for the above-described Work in response to its Advertisement for Bids, dated _____-_.

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: _____.

CITY OF MAGNOLIA, AR

Owner

By _____

Title Mayor

Acceptance of Notice

Receipt of the above Notice of Award is hereby acknowledged by:

_____

By_____

Title_____

CONTRACT

THIS AGREEMENT, made this 12TH day of March, 2012, by and between the

CITY OF MAGNOLIA, AR, herein called
(Corporation Name of Owner)

"Owner", acting herein through its MAYOR and
(Title of Authorized Official)

_____(a corporation)

of _____

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the construction described as follows:

CHEMICAL FEED SYSTEM

hereinafter called the project, for the sum of _____ and all extra work in connection therewith, under the terms as stated in the General and Special Conditions of the Contract; and at his (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal, the General Conditions, and Special Conditions of the Contract, the plans, which include all maps, plats, blue prints, and other drawings and printed or written explanatory matter thereof, the specifications and contract documents therefor as prepared by A.L. Franks Engineering, herein entitled the Engineer, and as enumerated in Paragraph 2 of the Supplemental Special Conditions, all of which are made a part hereof and collectively evidence and constitute the contract.

The Contractor hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within **60 consecutive calendar days** thereafter. The Contractor further agrees to pay, as liquidated damages, the sum of $500.00 for each consecutive calendar day thereafter as hereinafter provided in Section 9 of the Special Conditions.

The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the contract, subject to additions and deductions, as provided in the General Conditions of the Contract, and to make payments on account thereof as provided in Section 5, "Measurement and Payment," of the General Conditions.

IN WITNESS WHEREOF, the parties to these presents have executed this contract in three (3) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

CITY OF MAGNOLIA, AR
(Owner)

(Seal)

ATTEST:

By _____
Parnell Vann

_____
(Witness)

MAYOR
(Title)

(Seal)

_____
(Contractor)

By _____

_____
(Witness)

PRESIDENT
(Title)

ARKANSAS STATUTORY PERFORMANCE BOND

We_____

_____

as Principal, hereinafter called Principal, and _____, a corporation organized and existing under the law of the State of _____ and authorized to do business in the State of Arkansas, as Surety, are held and firmly bound unto _____ as Obligee, hereinafter called Owner, in the amount of _____acting

_____

Dollars ($_____), for the payment whereof Principal and Surety bind themselves, their heirs, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

Principal has by written agreement dated_____entered into a contract with Owner for

CHEMICAL FEED SYSTEM

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

THE CONDITION OF THIS OBLIGATION is such that if the Principal shall faithfully perform the Contract on his part and shall fully indemnify and save harmless the Owner from all cost and damage which he may suffer by reason of failure so to do and shall fully reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any such default, and, further, that if the Principal shall pay all persons all indebtedness for labor or materials furnished or performed under said Contract, failing which such persons shall have a direct right of action against the Principal and Surety, jointly and severally, under this obligation, subject to the Owner's

priority, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

No suit, action or proceeding shall be brought on this bond outside the State of Arkansas. No suit, action or proceeding shall be brought on this bond except by the Owner after six months from the date final payment is made on the Contract, nor shall any suit, action or proceeding be brought by the Owner after two years from the date on which the final payment under the Contract falls due.

Any alterations which may be made in the terms of the Contract, or in the work to be done under it, or the giving by the Owner of any extension of time for the performance of the Contract, or any other forbearance on the part of either the Owner or the Principal to the other shall not in any way release the Principal and the Surety or Sureties, or either or any of them, their heirs, personal representatives, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alteration, extension or forbearance being hereby waived.

In no event shall the aggregate liability of the Surety exceed the sum set out herein.

Executed on this _____ day of _____, 20___

_____
Principal

By _____

_____
Surety

By _____
Attorney-in-Fact

ARKANSAS STATUTORY PAYMENT BOND

We_____

_____

as Principal, hereinafter called Principal, and _____, a corporation organized and existing under the law of the State of _____ and authorized to do business in the State of Arkansas, as Surety, are held and firmly bound unto _____ as Obligee, hereinafter called Owner, in the amount of

_____

Dollars ($_____), for the payment whereof Principal and Surety bind themselves, their heirs, personal representatives, successors and assigns, jointly and severally, firmly by these presents.

Principal has by written agreement dated_____entered into a contract with Owner for

CHEMICAL FEED SYSTEM

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

THE CONDITION OF THIS OBLIGATION is such that if the Principal shall faithfully perform the Contract on his part and shall fully indemnify and save harmless the Owner from all cost and damage which he may suffer by reason of failure so to do and shall fully reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any such default, and, further, that if the Principal shall pay all persons all indebtedness for labor or materials furnished or performed under said Contract, failing which such persons shall have a direct right of action against the

Principal and Surety, jointly and severally, under this obligation, subject to the Owner's priority, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

No suit, action or proceeding shall be brought on this bond outside the State of Arkansas. No suit, action or proceeding shall be brought on this bond except by the Owner after six months from the date final payment is made on the Contract, nor shall any suit, action or proceeding be brought by the Owner after two years from the date on which the final payment under the Contract falls due.

Any alterations which may be made in the terms of the Contract, or in the work to be done under it, or the giving by the Owner of any extension of time for the performance of the Contract, or any other forbearance on the part of either the Owner or the Principal to the other shall not in any way release the Principal and the Surety or Sureties, or either or any of them, their heirs, personal representatives, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alteration, extension or forbearance being hereby waived.

In no event shall the aggregate liability of the Surety exceed the sum set out herein.

Executed on this _____ day of _____, 20___

_____
Principal

By _____

_____
Surety

By _____
Attorney-in-Fact

CERTIFICATE OF INSURANCE

TO: Date_____

_____ Project No. _____
Owner

_____ Type of Project_____
Address

THIS IS TO CERTIFY THAT

_____
(Name and address of insured)

is at the date of this certificate, insured by this Company with respect to the business operations hereinafter described, for the types of Insurance and in accordance with the provisions of the standard policies used by this Company, and further hereinafter described. Exceptions to standard policy noted on reverse side hereof.

TYPE OF INSURANCE

	Policy No.	Effective	Expires	Limits of Liability
Workmen's Compensation				
Public Liability				1 Person $ _____ 1 Accident $ _____
Contingent Liability				1 Person $ _____ 1 Accident $ _____
Property Damage				
Builder`s Risk				
Automobile				
Other				

The foregoing Policies (do) (do not) cover all sub-contractors.

Locations Covered: _____

Descriptions of Operations Covered: _____

The above policies either in the body thereof or by appropriate endorsement provide that they may not be changed or cancelled by the insurer in less than five days after the insured has received written notice of such change or cancellation.

Where applicable local laws or regulations require more than five days actual notice of change or cancellation to the assured, the above policies contain such special requirements, either in the body thereof or by appropriate endorsement thereto attached.

_____
(Name of Insurer)

By _____

Title _____

NOTICE TO PROCEED

To: _____
_____
_____

Date: _____

Project: CHEMICAL FEED SYSTEM

You are hereby notified to commence Work in accordance with the Agreement dated _____ on or before _____ and you are to complete the Work within 60 consecutive calendar days thereafter. The date of completion of all Work is therefore _____.

City of Magnolia, AR
Owner

By_____

Title Mayor

Acceptance of Notice

Receipt of the above Notice to Proceed

is hereby acknowledged by:

_____

this ___ day of _____:

By_____

Title President

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT: City of Magnolia, Arkansas
CHEMICAL FEED SYSTEM

CONTRACTOR: _____

CONTRACT: $_____ CONTRACT DATE: _____

This Certificate of Substantial Completion applies to all work under the Contract Documents or to the following specified parts thereof:

To: City of Magnolia, AR (Owner)

And To: _____ (Contractor)

The work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that WORK is hereby declared to be substantially complete in accordance with the Contract Documents on

_____
Date of Completion

A tentative list of items to be completed or corrected is attached hereto. This list may not be nil-inclusive, and the failure to include an item in it does not alter the responsibility of the CONTRACTOR to complete all the Work in accordance with the Contract Documents. When this Certificate applies to a specified part of the Work the items in the tentative list shall be completed or corrected by CONTRACTOR within _____ calendar days of the above date of Substantial Completion.

The date of Substantial Completion is the date upon which all guarantees and warranties begin, except as follows:

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities and insurance shall be as follows:

RESPONSIBILITIES:

OWNER:

_____

_____

_____

_____

CONTRACTOR:

_____

_____

_____

_____

The following documents are attached to and made a part of this Certificate:

EXECUTED by ENGINEER this _____ day of _____, 2018.

A.L. FRANKS ENGINEERING, INC.

_____
Anthony L. Franks, P.E.
Project Engineer

The CONTRACTOR accepts this Certificate of Substantial Completion on this _____ day of _____, 2018.

_____

GENERAL CONDITIONS

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GENERAL CONDITIONS OF AGREEMENT

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FOR

GENERAL CONDITIONS OF AGREEMENT
(Cont'd)

GENERAL CONDITIONS

1. DEFINITIONS OF TERMS

1.01 OWNER, CONTRACTOR AND ENGINEER. The OWNER, the CONTRACTOR and the ENGINEER are those persons or organizations identified as such in the Agreement and are referred to throughout the Contract Documents as if singular in number and masculine in gender. The term ENGINEER means the ENGINEER or his duly authorized representative. The ENGINEER shall be understood to be the ENGINEER of the OWNER, and nothing contained in the Contract Documents shall create any contractual or agency relationship between the ENGINEER and the CONTRACTOR.

1.02 CONTRACT DOCUMENTS. The Contract Documents shall consist of the Notice to Contractors (Advertisement), Special Conditions (Instructions to Bidders), Proposal, signed Agreement, Performance and Payment Bonds (when required), General Conditions of the Agreement, Technical Specifications, Plans, and all modifications thereof incorporated in any of the documents before the execution of the agreement.

The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. In case of conflict between any of the Contract Documents, priority of interpretation shall be in the following order: Signed Agreement, Performance and Payment Bonds, Special Bonds (if any), Proposal, Special Conditions of Agreement, Notice to Contractors, Technical Specifications, Plans, and General Conditions of Agreement.

1.03 SUB-CONTRACTOR. The term Sub-Contractor, as employed herein, includes only those having a direct contract with the CONTRACTOR and it includes one who furnished material worked to a special design according to the plans or specifications of this work, but does not include one who merely furnishes material not so worked.

1.04 WRITTEN NOTICE. Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice.

1.05 WORK. The CONTRACTOR shall provide and pay for all materials, supplies, machinery, equipment, tools, superintendence, labor, services, insurance, and all water, light, power, fuel, transportation and other facilities necessary for the execution and completion of the work covered by the Contract Documents. Unless otherwise specified, all materials shall be new and both workmanship and materials shall be of a good quality. The CONTRACTOR shall if required, furnish satisfactory evidence as to the kind and quality of materials. Materials or work described in words

which so applied have a well known technical or trade meaning shall be held to refer to such recognized standards.

1.06 EXTRA WORK. The term "Extra Work" as used in this contract shall be understood to mean and include all work that may be required by the ENGINEER or OWNER to be done by the CONTRACTOR to accomplish any change, alteration or addition to the work shown upon the plans, or reasonably implied by the specifications, and not covered by the CONTRACTOR'S Proposal, except as provided under "Changes and Alterations", herein.

1.07 WORKING DAY. A "Working Day" is defined as any day not including Saturdays, Sundays or legal holidays, in which weather or other conditions, not under the control of the CONTRACTOR, will permit construction of the principal units of the work for a period of not less than seven (7) hours between 7:00 a.m. and 6:00 p.m.

1.08 CALENDAR DAY. "Calendar Day" is any day of the week or month, no days being excepted.

1.09 SUBSTANTIALLY COMPLETED. By the term "substantially completed" is meant that the structure has been made suitable for use or occupancy or the facility is in condition to serve its intended purpose, but still may require minor miscellaneous work and adjustment.

1.10 CONFLICTS. Any conflict which occurs between these General Conditions and the attached General Conditions supplied by the Arkansas Soil and Water Conservation Commission (ASWCC), the ASWCC General Conditions shall govern.

2. RESPONSIBILITIES OF THE ENGINEER AND THE CONTRACTOR

2.01 OWNER-ENGINEER RELATIONSHIP. The ENGINEER will be the OWNER'S representative during construction. The duties, responsibilities and limitations of authority of the ENGINEER as the OWNER'S representative during construction are as set forth in the Contract Documents and shall not be extended or limited without written consent of the OWNER and ENGINEER. The ENGINEER will advise and consult with the OWNER, and all of OWNER'S instructions to the CONTRACTOR shall be issued through the ENGINEER.

2.02 PROFESSIONAL INSPECTION BY ENGINEER. The ENGINEER shall make periodic visits to the site to familiarize himself generally with the progress of the executed work and to determine if such work generally meets the essential performance and design features and the technical and functional engineering requirements of the Contract Documents; provided and except, however, that the ENGINEER shall not be responsible for making any detailed, exhaustive, comprehensive or continuous on-site inspection of the quality or quantity of the work or be in any way responsible, directly or indirectly, for the construction means, methods, techniques, sequences, quality,

procedures, programs, safety precautions or lack of same incident thereto or in connection therewith. Notwithstanding any other provision of this agreement or any other Contract Document, the ENGINEER shall not be in any way responsible or liable for any acts, errors, omissions or negligence of the CONTRACTOR, any subcontractor or any of the CONTRACTOR'S or subcontractor's agents, servants or employees or any other person, firm or corporation performing or attempting to perform any of the work.

2.03 PAYMENTS FOR WORK. The ENGINEER shall review CONTRACTOR'S applications for payment and supporting data, determine the amount owed to the CONTRACTOR and approve in writing, payment to CONTRACTOR in such amounts; such approval of payment to CONTRACTOR constitutes a representation to the OWNER of ENGINEER`S professional judgment that the work has progressed to the point indicated to the best of his knowledge, information and belief, but such approval of an application for payment to CONTRACTOR shall not be deemed as a representation by ENGINEER that ENGINEER has made any examination to determine how or for what purpose CONTRACTOR has used the moneys paid on account of the Contract price.

2.04 INITIAL DETERMINATIONS. The ENGINEER initially shall determine all claims, disputes and other matters in question between the CONTRACTOR and the OWNER relating to the execution or progress of the work or the interpretation of the Contract Documents and the ENGINEER`S decision shall be rendered in writing within a reasonable time. Should the ENGINEER fail to make such decision within a reasonable time, appeal to arbitration may be taken as if his decision had been rendered against the party appealing.

2.05 OBJECTIONS. In the event the ENGINEER renders any decision which, in the opinion of either party hereto, is not in accordance with the meaning and intent of this contract, either party may file with the ENGINEER within thirty days his written objection to the decision, and by such action may reserve the right to submit the question so raised to arbitration as hereinafter provided.

2.06 LINES AND GRADES. Unless otherwise specified, all lines and grades shall be furnished by the ENGINEER or his representative. Whenever necessary, construction work shall be suspended to permit performance of this work, but such suspension will be as brief as practicable and the CONTRACTOR shall be allowed no extra compensation therefor. The CONTRACTOR shall give the ENGINEER ample notice of the time and place where line and grades will be needed. All stakes, marks, etc., shall be carefully preserved by the CONTRACTOR, and in case of careless destruction or removal by or his employees, such stakes, marks, etc., shall be replaced at the CONTRACTOR'S expense.

2.07 CONTRACTOR'S DUTY AND SUPERINTENDENCE. The CONTRACTOR shall give adequate attention to the faithful prosecution and completion of this contract and shall keep on the work, during its progress, a competent superintendent and any necessary assistants. The superintendent shall represent the CONTRACTOR in his

absence and all directions given to him shall be as binding as if given to the CONTRACTOR.

The CONTRACTOR is and at all times shall remain an independent contractor, solely responsible for the manner and method of completing his work under this contract, with full power and authority to select the means, method and manner of performing such work, so long a such methods do not adversely affect the completed improvements, the OWNER and ENGINEER being interested only in the result obtained and conformity of such completed improvements to the plans, specifications and contract.

Likewise, the CONTRACTOR shall be solely responsible for the safety of himself, his employees and other persons, as well as for the protection of the safety of the improvements being erected and the property of himself or any other person, as a result of his operations hereunder. Engineering construction drawings and specifications as well as any additional information concerning the work to be performed passing from or through the ENGINEER shall not be interpreted as requiring or allowing CONTRACTOR to deviate from the plans and specifications, the intent of such drawings, specifications and any other such instructions being to define with particularity the agreement of the parties as to the work the CONTRACTOR is to perform. CONTRACTOR shall be fully and completely liable, at his own expense, for design, construction, installation and use, or non-use, of all items and methods incident to performance of the contract, and for all loss, damage or injury incident thereto, either to person or property, including, without limitation, the adequacy of all temporary supports, shoring, bracing, scaffolding, machinery or equipment, safety precautions or devices, and similar items or devices used by him during construction.

Any review of work in process, or any visit or observation during construction, or any clarification of plans and specifications, by the ENGINEER, or any agent, employee, or representative of either of them whether through personal observation on the project site or by means of approval of shop drawings for temporary construction or construction processes, or by other means or method, is agreed by the CONTRACTOR to be for the purpose of observing the extent and nature of work completed or being performed, as measured against the drawings and specifications constituting the contract, or for the purpose of enabling CONTRACTOR to more fully understand the plans and specifications so that the completed construction work will conform thereto, and shall in no way relieve the CONTRACTOR from full and complete responsibility for the proper performance of his work on the project, including but without limitation the propriety of means and methods of the CONTRACTOR in performing said contract, and the adequacy of any designs, plans or other facilities for accomplishing such performance. Deviation by the CONTRACTOR from plans and specifications that may have been in evidence during any such visitation or observation by the ENGINEER, or any of his representatives, whether called to the CONTRACTOR'S attention or not shall in no way relieve CONTRACTOR from his responsibility to complete all work in accordance with said plans and specifications.

2.08 CONTRACTOR'S UNDERSTANDING. It is understood and agreed that the CONTRACTOR has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this contract. No verbal agreement or conversation with any officer, agent or employee of the OWNER or ENGINEER either before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.

2.09 CHARACTER OF WORKMEN. The CONTRACTOR agrees to employ only orderly and competent men, skillful in the performance of the type of work required under this contract, to do the work; and agrees that whenever the ENGINEER shall inform him in writing that any man or men on the work are, in his opinion, incompetent, unfaithful or disorderly, such man or men shall be discharged from the work and shall not again be employed on the work without the ENGINEER'S written consent.

2.10 CONTRACTOR'S BUILDING. The building of structures for housing men, or the erection of tents or other forms of protection, will be permitted only at such places as the ENGINEER shall direct, and the sanitary conditions of the grounds in or about such structures shall at all times be maintained in a manner satisfactory to the ENGINEER.

2.11 SANITATION. Necessary sanitation conveniences for the use of laborers on the work, properly secluded from public observation, shall be constructed and maintained by the CONTRACTOR in such manner and at such points as shall be approved by the ENGINEER, and their use shall be strictly enforced.

2.12 SHOP DRAWINGS. The CONTRACTOR shall submit to the ENGINEER, with such promptness as to cause no delay in his own work or in that of any other Contractor, four checked copies, unless otherwise specified, of all shop and/or setting drawings and schedules required for the work of the various trades, and the ENGINEER shall pass upon them with reasonable promptness, making desired corrections. The CONTRACTOR shall make any corrections required by the ENGINEER, file with him two corrected copies and furnish such other copies as may be needed. The ENGINEER'S approval of such drawings or schedules shall not relieve the CONTRACTOR from responsibility for deviations from drawings or specifications, unless he has in writing called the ENGINEER'S attention to such deviations at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings or schedules. It shall be the CONTRACTOR'S responsibility to fully and completely review all shop drawings to ascertain their effect on his ability to perform the required contract work in accordance with the plans and specifications and within the contract time.

Such review by the ENGINEER shall be for the sole purpose of determining the sufficiency of said drawings or schedules to result in finished improvements in conformity with the plans and specifications, and shall not relieve the CONTRACTOR of his duty as an independent contractor as previously set forth, it being expressly understood and agreed that the ENGINEER does not assume any duty to pass upon the propriety or adequacy of such drawings or schedules, or any means or methods reflected thereby, in relation to the safety of either person or property during CONTRACTOR'S performance hereunder.

2.13 PRELIMINARY APPROVAL. The ENGINEER shall not have the power to waive the obligations of this contract for furnishing by the CONTRACTOR of good material, and of his performing good work as herein described, and in full accordance with the plans and specifications. No failure or omission of the ENGINEER to discover, object to or condemn any defective work or material shall release the CONTRACTOR from the obligation to at once tear out, remove and properly replace the same at any time prior to final acceptance upon the discovery of said defective work or material; provided, however, that the ENGINEER shall, upon request of the CONTRACTOR, inspect and accept or reject any material furnished, and in event the material has been once accepted by the ENGINEER, such acceptance shall be binding on the OWNER, unless it can be clearly shown that such material furnished does not meet the specifications for this work.

Any questioned work may be ordered taken up or removed for re-examination, by the ENGINEER, prior to final acceptance, and if found not in accordance with the specifications for said work, all expense of removing, re-examination and replacement shall be borne by the CONTRACTOR, otherwise the expense thus incurred shall be allowed as EXTRA WORK, and shall be paid for by the OWNER; provided that, where inspection or approval is specifically required by the specifications prior to performance of certain work, should the CONTRACTOR proceed with such work without requesting prior inspection or approval he shall bear all expense of taking up, removing, and replacing this work if so directed by the ENGINEER.

2.14 DEFECTS AND THEIR REMEDIES. It is further agreed that if the work or any part thereof, or any material brought on the site of the work for use in the work or selected for the same, shall be deemed by the ENGINEER as unsuitable or not in conformity with the specifications, the CONTRACTOR shall, after receipt of written notice thereof from the ENGINEER, forthwith remove such material and rebuild or otherwise remedy such work so that it shall be in full accordance with this contract.

2.15 CHANGES AND ALTERATIONS. The CONTRACTOR further agrees that the OWNER may make such changes and alterations as the OWNER may see fit, in the line, grade, form, dimensions, plans or materials for the work herein contemplated, or any part thereof, either before or after the beginning of the construction, without affecting the validity of this contract and the accompanying Performance and Payment Bonds.

If such changes or alterations diminish the quantity of the work to be done, they shall not constitute the basis for a claim for damages, or anticipated profits on the work that may be dispensed with, except as provided for unit price items under Section 5 "Measurement and Payment." If the amount of work is increased, and the work can fairly be classified under the specifications, such increase shall be paid for according to the quantity actually done and at the unit price, if any, established for such work under this contract, except as provided for unit price items under Section 5 "Measurement and Payment;" otherwise, such additional work shall be paid for as provided under Extra Work. In case the OWNER shall make such changes or alterations as shall make useless any work already done or material already furnished or used in said work, then the OWNER shall recompense the CONTRACTOR for any material or labor so used, and for any actual loss occasioned by such change, due to actual expenses incurred in preparation for the work as originally planned.

3. GENERAL OBLIGATIONS AND RESPONSIBILITIES

3.01 KEEPING OF PLANS AND SPECIFICATIONS ACCESSIBLE. The ENGINEER shall furnish the CONTRACTOR with an adequate and reasonable number of copies of all plans and specifications without expense to him, and the CONTRACTOR shall keep one copy of the same constantly accessible on the work, with the latest revisions noted thereon.

3.02 OWNERSHIP OF DRAWINGS. All drawings, specifications and copies thereof furnished by the ENGINEER shall not be reused on other work, and, with the exception of the signed contract sets, are to be returned to him on request, at the completion of the work. All models are the property of the OWNER.

3.03 ADEQUACY OF DESIGN. It is understood that the OWNER believes it has employed competent engineer and designers. It is, therefore, agreed that the OWNER shall be responsible for the adequacy of the design, sufficiency of the Contract Documents, the safety of the structure and the practicability of the operations of the completed project; provided the CONTRACTOR has complied with the requirements of the said Contract Documents, all approved modifications thereof, and additions and alterations thereto approved in writing by the 0WNER. The burden of proof of such compliance shall be upon the CONTRACTOR to show that he has complied with the said requirements of the Contract Documents, approved modifications thereof and all approved additions and alterations thereto.

3.04 RIGHT OF ENTRY. The OWNER reserves the right to enter the property or location on which the works herein contracted for are to be constructed or installed, by such agent or agents as he may elect, for the purpose of inspecting the work, or for the purpose of constructing or installing such collateral work as said OWNER may desire.

3.05 COLLATERAL CONTRACTS. The OWNER agrees to provide by separate contract or otherwise, all labor and material essential to the completion of the work specifically excluded from this contract, in such manner as not to delay the progress of the work, or damage said CONTRACTOR, except where such delays are specifically mentioned elsewhere in the Contract Documents.

3.06 DISCREPANCIES AND OMISSIONS. It is further agreed that it is the intent of this contract that all work must be done and all material must be furnished in accordance with the generally accepted practice, and in the event of any discrepancies between the separate contract documents, the priority of interpretation defined under "Contract Documents" shall govern. In the event that there is still any doubt as to the meaning and intent of any portion of the contract, specifications or drawings, the ENGINEER shall define which is intended to apply to the work.

3.07 EQUIPMENT, MATERIALS AND CONSTRUCTION PLANT. The CONTRACTOR shall be responsible for the care, preservation, conservation, and protection of all materials, supplies, machinery, equipment, tools, apparatus, accessories, facilities, all means of construction, and any and all parts of the work, whether the CONTRACTOR has been paid, partially paid, or not paid for such work, until the entire work is completed and accepted.

3.08 DAMAGES. In the event the CONTRACTOR is damaged in the course of the completion of the work by the act, neglect, omission, mistake or default of the OWNER, or of the ENGINEER, or of any other CONTRACTOR employed by the OWNER upon the work, thereby causing loss to the CONTRACTOR, the OWNER agrees to reimburse the CONTRACTOR for such loss. In the event the OWNER is damaged in the course of the work by the act, negligence, omission, mistake or default of the CONTRACTOR, or should the CONTRACTOR unreasonably delay the progress of the work being done by others on the job so as to cause loss for which the OWNER becomes liable, then the CONTRACTOR shall reimburse the OWNER for such loss.

3.09 PROTECTION AGAINST ACCIDENT TO EMPLOYEES AND THE PUBLIC. The CONTRACTOR shall at all times exercise reasonable precautions for the safety of employees and others on or near the work and shall comply with all applicable provisions of Federal, State, and Municipal safety laws and building and construction codes. All machinery and equipment and other physical hazards shall be guarded in accordance with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America except where incompatible with Federal, State, or Municipal laws or regulations. The CONTRACTOR shall provide such machinery guards, safe walkways, ladders, bridges, gangplanks, and other safety devices. The safety precautions actually taken and their adequacy shall be the sole responsibility of the CONTRACTOR, acting at his discretion as an independent contractor.

3.10 PERFORMANCE AND PAYMENT BONDS. Unless otherwise specified, it is further agreed by the parties to this Contract that the CONTRACTOR will execute separate performance and payment bonds, each in the sum of one hundred (100)

percent of the total contract price, in standard forms for this purpose, guaranteeing faithful performance of the work and the fulfillment of any guarantees required, and further guaranteeing payment to all persons supplying labor and materials or furnishing him any equipment in the execution of the Contract, and it is agreed that this Contract shall not be in effect until such performance and payment bonds are furnished and approved by the OWNER.

Unless otherwise approved in writing by the OWNER, the surety company underwriting the bonds shall be acceptable according to the latest list of companies holding certificates of authority from the Secretary of the Treasury of the United States.

Unless otherwise specified, the cost of the premium for the performance and payment bonds shall be included in the CONTRACTOR'S proposal.

3.11 LOSSES FROM NATURAL CAUSES. Unless otherwise specified, all loss or damage to the CONTRACTOR arising out of the nature of the work to be done, or from the action of the elements, or from any unforeseen circumstance in the prosecution of the same, or from unusual obstructions or difficulties which may be encountered in the prosecution of the work, shall be sustained and borne by the CONTRACTOR at his own cost and expense.

3.12 PROTECTION OF ADJOINING PROPERTY. The said CONTRACTOR shall take proper means to protect the adjacent or adjoining property or properties in any way encountered, which might be injured or seriously affected by any process of construction to undertaken under this Agreement, from any damage or injury by reason of said process of construction; and he shall be liable for any and all claims for such damage on account of his failure to fully protect all adjoining property. The CONTRACTOR agrees to idemnify, save and hold harmless the OWNER and ENGINEER against any claim or claims for damages due to any injury to any adjacent or adjoining property, arising or growing out of the performance of the contract; but any such indemnity shall not apply to any claim of any kind arising out of the existence or character of the work.

3.13 PROTECTION AGAINST CLAIMS OF SUB-CONTRACTORS, LABORERS, MATERIALMEN AND FURNISHERS OF MACHINERY, EQUIPMENT AND SUPPLIES. The CONTRACTOR agrees that he will indemnify and save the OWNER and ENGINEER harmless from all claims growing out of the lawful demands of sub-contractors, laborers, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. When so desired by the OWNER, the CONTRACTOR shall furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged or waived. If the CONTRACTOR fails so to do, then the OWNER may at the option of the CONTRACTOR either pay directly any unpaid bills, of which the OWNER has written notice, or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to liquidate any and all such lawful claims until

satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payments to the CONTRACTOR shall be resumed in full, in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligation upon the OWNER by either the CONTRACTOR or his Surety.

3.14 PROTECTION AGAINST ROYALTIES OR PATENTED INVENTION. The CONTRACTOR shall pay all royalties and license fees, and shall provide for the use of any design, device, material or process covered by letters patent or copyright by suitable legal agreement with the patentee or owner. The CONTRACTOR shall defend all suits or claims for infringement of any patent or copyright rights and shall indemnify and save the OWNER and ENGINEER harmless from any loss on account thereof, except that the OWNER shall defend all such suits and claims and shall be responsible for all such loss when a particular design, device, material or process or the product of a particular manufacturer or manufacturers is specified or required by the OWNER; provided, however, if choice of alternate design, device, material or process is allowed to the CONTRACTOR, then CONTRACTOR shall idemnify and save OWNER harmless from any loss on account thereof. If the material or process specified or required by the OWNER is an infringement, the CONTRACTOR shall be responsible for such loss unless he promptly gives such information to the OWNER.

3.15 LAWS AND ORDINANCES. The CONTRACTOR shall at all times observe and comply with all Federal, State and local laws, ordinances and regulations, which in any manner affect the contract or the work, and shall indemnify and save harmless the OWNER and ENGINEER against any claim arising from the violation of any such laws, ordinances, and regulations whether by the CONTRACTOR or his employees, except where such violations are called for by the provisions of the Contract Documents. If the CONTRACTOR observes that the plans and specifications are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in the contract for changes in the work. If the CONTRACTOR performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the ENGINEER, he shall bear all costs arising therefrom. In case the OWNER is a body politic and corporate, the law from which it derives its powers, insofar as the same regulates the objects for which, or the manner in which, or the conditions under which the same regulates the objects for which, or the manner in which, or the conditions under which the OWNER may enter into contract, shall be controlling, and shall be considered as part of this contract, to the same effect as though embodied herein.

3.16 ASSIGNMENT AND SUBLETTING. The CONTRACTOR further agrees that he will retain personal control and will give his personal attention to the fulfillment of this contract and that he will not assign by Power of Attorney, or otherwise, or sublet said contract without the written consent of the ENGINEER, and that no part or feature of the work will be sublet to anyone objectionable to the ENGINEER or the OWNER. The CONTRACTOR further agrees that the subletting of any portion or feature of the

work, or materials required in the performance of this contract, shall not relieve the CONTRACTOR from his full obligations to the OWNER, as provided by this Agreement.

3.17 INDEMNIFICATION. The CONTRACTOR shall defend, indemnify and hold harmless the OWNER and the ENGINEER and their respective officers, agents and employees, from and against all damages, claims, losses, demands, suits, judgments and costs, including reasonable attorneys' fees and expenses, arising out of or resulting from the performance of the work, provided that any such damages, claim, loss, demand, suit, judgment, cost or expense:

(1) Is attributable to bodily injury, sickness, disease or death or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom; and,

(2) Is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any one of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

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, reports, surveys, Change Orders, designs or specifications, or the giving of or the failure to give directions or instructions by the ENGINEER, his agents or employees, provided such giving or failure to give is the primary cause of the injury or damage.

3.18 CERTIFICATE OF INSURANCE. Before commencing any of the work, CONTRACTOR shall file with the OWNER valid Certificates of Insurance acceptable to the OWNER and the ENGINEER. Such Certificates shall contain a provision that coverages afforded under the policies will not be cancelled until at least fifteen days' prior written notice has been given to the OWNER.

The CONTRACTOR shall also file with the OWNER valid Certificates of Insurance covering all sub-contractors.

4. PROSECUTION AND PROGRESS

4.01 TIME AND ORDER OF COMPLETION. It is the meaning and intent of this contract, unless otherwise herein specifically provided, that the CONTRACTOR shall be allowed to prosecute his work at such times and seasons, in such order of precedence, and in such manner as shall be most conducive to economy of construction: provided, however, that the order and the time of prosecution shall be such that the work shall be substantially completed as a whole and in part, in accordance with this contract, the plans and specifications, and within the time of completion designated in the Proposal; provided, also, that when the OWNER is having other work done, either by contract or

by his own force, the ENGINEER may direct the time and manner of constructing the work done under this contract, so that conflict will be avoided and the construction of the various works being done for the OWNER shall be harmonized.

The CONTRACTOR shall submit, at such times as may reasonably be requested by the ENGINEER, schedules which shall show the order in which the CONTRACTOR proposes to carry on the work, with dates at which the CONTRACTOR will start the several parts of the work, and estimated dates of completion of the several parts.

4.02 EXTENSION OF TIME. Should the CONTRACTOR be delayed in the completion of the work by any act or neglect of the OWNER or ENGINEER, or of any employee of either, or by other contractors employed by the OWNER, or by changes ordered in the work, or by strikes, lockouts, fires, and unusual delays by common carriers, or unavoidable cause or causes beyond the CONTRACTOR'S control, or by any cause which the ENGINEER shall decide justifies the delay, then an extension of time shall be allowed for completing the work, sufficient to compensate for the delay, the amount of the extension to be determined by the ENGINEER, provided, however, that the CONTRACTOR shall give the ENGINEER prompt notice in writing of the cause of such delay.

4.03 HINDRANCES AND DELAYS. No claims shall be made by the CONTRACTOR for damages resulting from hindrances or delays from any cause (except where the work is stopped by order of the OWNER) during the progress of any portion of the work embraced in this contract. In case said work shall be stopped by the act of the OWNER, then such expense as in the judgment of the ENGINEER is caused by such stoppage of said work shall be paid by the OWNER to the CONTRACTOR.

5. MEASUREMENT AND PAYMENT

5.01 QUANTITIES AND MEASUREMENTS. No extra or customary measurements of any kind will be allowed, but the actual measured and/or computed length, area, solid contents, number and weight only shall be considered, unless otherwise specifically provided.

5.02 ESTIMATED QUANTITIES. This agreement, including the specifications, plans and estimate, is intended to show clearly all work to be done and material to be furnished hereunder. Where the estimated quantities are shown for the various classes of work to be done and material to be furnished under this contract, they are approximate and are to be used only as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It is understood and agreed that the actual amount of work to be done and material to be furnished under this contract may differ somewhat from these estimates, and that where the basis for payment under this contract is the unit price method, payment shall be for the actual amount of such work done and the material furnished.

Where payment is based on the unit price method, the CONTRACTOR agrees that he will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this contract and the estimated quantities contemplated and contained in the proposal; provided, however, that in case the actual quantity of any major item should become as much as 20% more than, or 20% less than the estimated or contemplated quantity for such items, then either party to this Agreement, upon demand, shall be entitled to a revised consideration upon the portion of the work above or below 20% of the estimated quantity.

A "Major Item" shall be construed to be any individual bid item incurred in the proposal that has a total cost equal to or greater than five (5) per cent of the total contract cost, computed on the basis of the proposal quantities and the contract unit prices.

Any revised consideration is to be determined by agreement between parties, otherwise by the terms of this Agreement, as provided under "Extra Work."

5.03 PRICE OF WORK. In consideration of the furnishing of all the necessary labor, equipment and material, and the completion of all work by the CONTRACTOR, and on the completion of all work and of the delivery of all material embraced in this Contract in Full conformity with the specifications and speculations herein contained, the OWNER agrees to pay the CONTRACTOR the prices set forth in the Proposal hereto attached, which has been made a part of this contract. The CONTRACTOR hereby agrees to receive such prices in full for furnishing all material and all labor required for aforesaid work, also for all expense incurred by him, and for well and truly performing the same and the whole thereof in the manner and according to this Agreement.

5.04 PARTIAL PAYMENTS. On or before the 10th day of each month, the CONTRACTOR shall prepare and submit to the ENGINEER for approval or modification a statement showing as completely as practicable the total value of the work done by the CONTRACTOR up to and including the last day of the preceding month; said statement shall also include the value of all sound materials delivered on the site of the work that are to be fabricated into the work.

The OWNER shall then pay the CONTRACTOR on or before the 15th day of the current month the total amount of the approved statement, less 10 per cent of the amount thereof, which 10 per cent shall be retained until final payment, and further less all previous payments and all further sums that may be retained by the OWNER under the terms of this Agreement. It is understood, however, that in case the whole work be near to completion and some unexpected and unusual delay occurs due to no fault or neglect on the part of the CONTRACTOR, the OWNER may upon written recommendation of the ENGINEER pay a reasonable and equitable portion of the retained percentage to the CONTRACTOR, or the CONTRACTOR at the OWNER'S option, may be relieved of the obligation to fully complete the work and, thereupon, the

CONTRACTOR shall receive payment of the balance due him under the contract subject only to conditions stated under "Final Payment."

5.05 USE OF COMPLETED PORTIONS. The OWNER shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions may not have expired but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the work, the CONTRACTOR shall be entitled to such extra compensation, or extension of time, or both, as the ENGINEER may determine.

The CONTRACTOR shall notify the ENGINEER when, in the CONTRACTOR'S opinion, the contract is "substantially completed" and when so notifying the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER in writing a detailed list of unfinished work. The ENGINEER will review the CONTRACTOR'S list of unfinished work and will add thereto such items as the CONTRACTOR has failed to include. The "substantial completion" of the structure or facility shall not excuse the CONTRACTOR from performing all of the work undertaken, whether of a minor or major nature, and thereby completing the structure or facility in accordance with the Contract Documents.

5.06. FINAL COMPLETION AND ACCEPTANCE. Within ten (10) days after the CONTRACTOR has given the ENGINEER written notice that the work has been completed, or substantially completed, the ENGINEER and the OWNER shall inspect the work and within said time, if the work be found to be completed or substantially completed in accordance with the Contract Documents, the ENGINEER shall issue to the OWNER and the CONTRACTOR his Certificate of Completion, and thereupon it shall be the duty of the OWNER within ten (10) days to issue a Certificate of Acceptance of the work to the CONTRACTOR or to advise the CONTRACTOR in writing of the reason for non-acceptance.

5.07 FINAL PAYMENT. Upon the issuance of the Certificate of Completion, the ENGINEER shall proceed to make final measurements and prepare final statement of the value of all work performed and materials furnished under the terms of the Agreement and shall certify same to the OWNER, who shall pay to the CONTRACTOR on or before the 30th day, and before the 35th day, after the date of the Certificate of Completion, the balance due the CONTRACTOR under the terms of this Agreement, provided he has fully performed his contractual obligations under the terms of this contract; and said payment shall become due in any event upon said performance by the CONTRACTOR. Neither the Certificate of Acceptance nor the final payment, nor any provision in the Contract Documents, shall relieve the CONTRACTOR of the obligation for fulfillment of any warranty which may be required.

5.08 PAYMENTS WITHHELD. The OWNER may, on account of subsequently discovered evidence, withhold or nullify the whole or part of any certificate to such extent as may be necessary to protect himself from loss on account of:

(a) Defective work not remedied.
(b) Claims filed or reasonable evidence indicating probable filing of claims.
(c) Failure of the CONTRACTOR to make payments properly to subcontractors or for material or labor.
(d) Damage to another contractor.
(e) Reasonable doubt that the work can be completed for the unpaid balance of the contract amount.
(f) Reasonable indication that the work will not be completed within the contract time.

When the above grounds are removed or the CONTRACTOR provides a Surety Bond satisfactory to the OWNER, which will protect the OWNER in the amount withheld, payment shall be made for amounts withheld because of them.

5.09 DELAYED PAYMENTS. Should the OWNER fail to make payment to the CONTRACTOR of the sum named in any partial or final statement, when payment is due, then the OWNER shall pay to the CONTRACTOR, in addition to the sum shown as due by such statement, interest thereon at the rate of six (6) per cent per annum, unless otherwise specified, from date due as provided under "Partial Payments" and "Final Payments," until fully paid, which shall fully liquidate any injury to the CONTRACTOR growing out of such delay in payment, but the right is expressly reserved to the CONTRACTOR in the event payments be not promptly made, as provided under "Partial Payments," to at any time thereafter treat the contract as abandoned by the OWNER and recover compensation, as provided under "Abandonment of Contract," unless such payments are withheld in accordance with the provisions of "Payments Withheld."

6. EXTRA WORK AND CLAIMS

6.01 CHANGE ORDERS: Without invalidating this Agreement, the OWNER may, at any time or from time to time, order deletions or revisions to the work; such changes will be authorized by Change Order to be prepared by the ENGINEER for execution by the OWNER and the CONTRACTOR. The Change Order shall set forth the basis for any change in contract price, as hereinafter set forth for Extra Work, and any change in contract time which may result from the change.

In the event the CONTRACTOR shall refuse to execute a Change Order which has been prepared by the ENGINEER and executed by the OWNER, the ENGINEER may in writing instruct the CONTRACTOR to proceed with the work as set forth in the

Change Order and the CONTRACTOR may make claim against the OWNER for Extra Work involved therein, as hereinafter provided.

6.02 MINOR CHANGES: The ENGINEER may authorize minor changes in the work not inconsistent with the overall intent of the Contract Documents and not involving an increase in Contract Price. If the CONTRACTOR believes that any minor change or alteration authorized by the ENGINEER involves Extra Work and entitles him to an increase in the Contract Price, the Contractor shall make written request to the ENGINEER for a written Field Order.

In such case, the CONTRACTOR by copy of his communication to the ENGINEER or otherwise in writing shall advise the OWNER of his request to the ENGINEER for a written Field Order and that the work involved may result in an increase in the Contract Price.

Any request by the CONTRACTOR for a change in Contract Price shall be made prior to beginning the work covered by the proposed change.

6.03 EXTRA WORK: It is agreed that the basis of compensation to the CONTRACTOR for work either added or deleted by a Change Order or for which a claim for Extra Work is made shall be determined by one or more of the following methods:

Method (A)	-	By agreed unit prices; or
Method (B)	-	By agreed lump sum; or
Method (C)	-	If neither Method (A) nor Method (B) be agreed upon before the Extra Work is commenced, then the CONTRACTOR shall be paid the "actual field cost" of the work, plus fifteen (15) percent.

In the event said Extra Work be performed and paid for under Method (C), then the provisions of this paragraph shall apply and the "actual field cost" is hereby defined to include the cost to the CONTRACTOR of all workmen, such as foreman, timekeepers, mechanics and laborers, and materials, supplies, teams, trucks, rentals on machinery and equipment, for the time actually employed or used on such Extra Work, plus actual transportation charges necessarily incurred, together with all power, fuel, lubricants, water and similar operating expenses, also all necessary incidental expenses incurred directly on account of such Extra Work, including Social Security, Old Age Benefits and other payroll taxes, and, a rateable proportion of premiums on Performance and Payment Bonds and Maintenance Bonds, Public Liability and Property Damage and Workmen`s Compensation, and all other insurance as may be required by any law or ordinance, or directed by the OWNER, or by them agreed to. The ENGINEER may direct the form in which accounts of the "actual field cost" shall be kept and the records of these accounts shall be made available to the ENGINEER. The ENGINEER or OWNER may also specify in writing, before the work commences, the method of doing the work and the type and kind of machinery and equipment to be

used; otherwise these matters shall be determined by the CONTRACTOR. Unless otherwise agreed upon, the prices for the use of machinery and equipment shall be determined by using 100 per cent, unless otherwise specified, of the latest schedule of Equipment Ownership Expense adopted by the Associated General Contractors of America. Where practicable the terms and prices for the use of machinery and equipment shall be incorporated in the Written Extra Work Order. The fifteen (15%) per cent of the "actual field cost" to be paid the CONTRACTOR shall cover and compensate him for his profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the "actual field cost" as herein defined, save that where the CONTRACTOR'S Camp or Field Office must be maintained primarily on account of such Extra Work; then the cost to maintain and operate the same shall be included in the "actual field cost."

No claim for Extra Work of any kind will be allowed unless ordered in writing by the ENGINEER. In case any orders or instructions, either oral or written, appear to the CONTRACTOR to involve Extra Work for which he should receive compensation or an adjustment in the construction time, he shall make written request to the ENGINEER for written order authorizing such Extra Work. Should a difference of opinion arise as to what does not constitute Extra Work, or as to the payment therefore, and the ENGINEER insists upon its performance, the CONTRACTOR shall proceed with the work after making written request for written order and shall keep an accurate account of the "actual field cost" thereof, as provided under Method (C). The CONTRACTOR will thereby preserve the right to submit the matter of payment to arbitration, as hereinbelow provided.

6.04 TIME OF FILING CLAIMS. It is further agreed by both parties hereto that all questions of dispute or adjustment presented by the CONTRACTOR shall be in writing and filed with the ENGINEER within thirty (30) days after the ENGINEER has given any directions, order or instruction to which the CONTRACTOR desires to take exception. The ENGINEER shall reply within thirty (30) days to such written exceptions by the CONTRACTOR and render his final decision in writing. In case the CONTRACTOR should appeal from the ENGINEER'S decision, any demand for arbitration shall be filed with the ENGINEER and the OWNER in writing within ten (10) days after the date of delivery to CONTRACTOR of the ENGINEER'S final decision. It is further agreed that final acceptance of the work by the OWNER and the acceptance by the CONTRACTOR of the final payment shall be a bar to any claims by either party, except where noted otherwise in the Contract Documents.

6.05 ARBITRATION. All questions of dispute under this Agreement shall be submitted to arbitration if agreed to by both parties.. The parties may agree upon one arbiter, otherwise, there shall be three, one named in writing by each party, and the third chosen by the two arbiters so selected; or if the arbiters fail to select a third within ten (10) days, he shall be chosen by a District Judge serving the County in which the major portion of the project is located, unless otherwise specified. Should the party demanding arbitration fail to name an arbiter within ten (10) days of the demand, his right to arbitrate shall lapse, and the decision of the ENGINEER shall be final and

binding on him. Should the other party fail to choose an arbiter within ten(10) days, the ENGINEER shall appoint such arbiter. Should either party refuse or neglect to supply the arbiters with any papers or information demanded in writing, the arbiters are empowered by both parties to take ex parte proceedings.

The arbiters shall act with promptness. The decision of any two shall be binding on both parties to the contract. The decision of the arbiters upon any question submitted to arbitration under this contract shall be a condition precedent to any right of legal action. The decision of the arbiter or arbiters may be filed in court to carry it into effect.

The arbiters, if they deem the case demands it, are authorized to award the party whose contention is sustained, such sums as they deem proper for the time, expense and trouble incident to the appeal, and if the appeal was taken without reasonable cause, they may award damages for any delay occasioned thereby. the arbiters shall fix their own compensation, unless otherwise provided by agreement, and shall assess the cost and charges of the arbitration upon either or both parties. The award of the arbiters must be made in writing.

7. ABANDONMENT OF CONTRACT

7.01 ABANDONMENT BY CONTRACTOR. In case the CONTRACTOR should abandon and fail or refuse to resume work within ten (10) days after written notification from the OWNER, or the ENGINEER, or if the CONTRACTOR fails to comply with the orders of the ENGINEER, when such orders are consistent with the Contract Documents, then, and in that case, where performance and payment bonds exist, the Sureties on these bonds shall be notified in writing and directed to complete the work, and a copy of said notice shall be delivered to the CONTRACTOR.

After receiving said notice of abandonment the CONTRACTOR shall not remove from the work any machinery, equipment, tools, materials or supplies then on the job, but the same, together with any materials and equipment under contract for the work, may be held for use on the work by the OWNER or the Surety on the performance bond, or another contractor in completion of the work; and the CONTRACTOR shall not receive any rental or credit therefore (except when used in connection with Extra Work, where credit shall be allowed as provided for under Section 6, Extra Work and Claims), it being understood that the use of such equipment and materials will ultimately reduce the cost to complete the work and be reflected in the final settlement.

Where there is no performance bond provided or in case the Surety should fail to commence compliance with the notice for completion hereinbefore provided for, within ten (10) days after service of such notice, then the OWNER may provide for completion of the work in either of the following elective manners:

7.01.1 The OWNER may thereupon employ such force of men and use such machinery, equipment, tools, materials and supplies as said OWNER may deem necessary to complete the work and charge the expense of such labor, machinery, equipment, tools, materials and supplies to said CONTRACTOR, and expense so charged shall be deducted and paid by the OWNER out of such moneys as may be due, or that may thereafter at any time become due to the CONTRACTOR under and by virtue of this Agreement. In case such expense is less than the sum which would have been payable under this contract, if the same had been completed by the CONTRACTOR, then said CONTRACTOR shall receive the difference. In case such expense is greater than the sum which would have been payable under this contract, if the same had been completed by said CONTRACTOR, then the CONTRACTOR and/or his Surety shall pay the amount of such excess to the OWNER; or

7.01.2 The OWNER under sealed bids, after five (5) days notice published one or more times in a newspaper having general circulation in the county of the location of the work, may let the contract for the completion of the work under substantially the same terms and conditions which are provided in this contract. In case any increase in cost to the OWNER under the new contract as compared to what would have been the cost under this contract, such increase shall be charged to the CONTRACTOR and the Surety shall be and remain bound therefore. however, should the cost to complete any such new contract prove to be less than what would have been the cost to complete under this contract, the CONTRACTOR and/or his Surety shall be credited therewith.

When the work shall have been substantially completed the CONTRACTOR and his Surety shall be so notified and Certificates of Completion and Acceptance, as provided in Paragraph 5.06 hereinabove, shall be issued. A complete itemized statement of the contract accounts, certified to by the ENGINEER as being correct, shall then be prepared and delivered to the CONTRACTOR and his Surety, whereupon the CONTRACTOR and/or his Surety, or the OWNER as the case may be, shall pay the balance due as reflected by said statement, within fifteen (15) days after the date of such Certificate of Completion.

In the event the statement of accounts shows that the cost to complete the work is less than that which would have been the cost to the OWNER had the work been completed by the CONTRACTOR under the terms of this contract; or when the CONTRACTOR and/or his Surety shall pay the balance shown to be due by them to the OWNER, then all machinery, equipment, tools, materials or supplies left on the site of the work shall be turned over to the CONTRACTOR and/or his Surety. Should the cost to complete the work exceed the contract price, the CONTRACTOR and/or his Surety fail to pay the amount due the OWNER within the time designated hereinabove, and there remains any machinery, equipment, tools, materials or supplies on the site of the work, notice thereof, together with an itemized list of such equipment and materials, shall be mailed to the CONTRACTOR and his Surety at the respective addresses designated in this contract, provided, however, that actual written notice given in any manner will satisfy this condition. After mailing, or other giving of such notice, such property shall be held at the risk of the CONTRACTOR and his Surety subject only to

the duty of the OWNER to exercise ordinary care to protect such property. After fifteen (15) days from the date of said notice the OWNER may sell such machinery, equipment, tools, materials or supplies and apply the net sum derived from such sale to the credit of the CONTRACTOR and his Surety. Such sale may be made at either public or private sale, with or without notice, as the OWNER may elect. The OWNER shall release any machinery, equipment, tools, materials, or supplies, which remain on the work, and belong to persons other than the CONTRACTOR or his Surety, to their proper owner. The books on all operations provided herein shall be open to the CONTRACTOR and his Surety.

7.02 ABANDONMENT BY OWNER. In case the OWNER shall fail to comply with the terms of this contract, and should fail or refuse to comply with said terms within ten (10) days after written notification by the CONTRACTOR, then the CONTRACTOR may suspend or wholly abandon the work, and may remove therefrom all machinery, tools and equipment, and all materials on the site of work that have not been included in payments to the CONTRACTOR and have not been wrought into the work. And thereupon the ENGINEER shall make an estimate of the total amount earned by the CONTRACTOR, which estimate shall include the value of all work actually completed by said CONTRACTOR (at the prices stated in the attached proposal where unit prices are used), the value of all partially completed work at a fair and equitable price, and the amount of all Extra Work performed at the prices agreed upon, or provided for by the terms of this contract, and a reasonable sum to cover the cost of any provisions made by the CONTRACTOR to carry the whole work to completion and which cannot be utilized. The ENGINEER shall then make a final statement of the balance due the CONTRACTOR by deduction from the above estimate all previous payments by the OWNER and all other sums that may be retained by the OWNER under the terms of this Agreement and shall certify same to the OWNER who shall pay to the CONTRACTOR on or before thirty (30) days after the date of the notification by the CONTRACTOR the balance shown by said final statement as due the CONTRACTOR, under the terms of this Agreement.

SPECIAL CONDITIONS

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SPECIAL CONDITIONS

1. OWNER. Whenever the term "Owner" appears in these specifications, it shall be understood to mean City of Magnolia, Arkansas.

2. ENGINEER. The word "Engineer" in these specifications shall be understood as referring to A.L. Franks Engineering, Inc., 118 East Broad Street, Texarkana, Arkansas, Engineer of the Owner, or such other Engineer, Supervisor or Inspector as may be authorized by said Owner to act in any particular position.

3. EXAMINATION OF SITE OF PROJECT. Prospective bidders shall make a careful examination of the site of the project, soil and water conditions to be encountered, improvements to be protected, disposal sites for surplus materials not designated to be salvaged materials, and methods of providing ingress and egress to private properties and of handling traffic during construction of the entire project.

4. QUALIFICATION OF LOW BIDDER. Before being awarded a contract, the low bidder shall submit such evidence as the Engineer may require to establish his financial responsibility, experience, and possession of such equipment as may be needed to prosecute the work in an expeditious, safe, and satisfactory manner.

Should the low bidder fail to produce evidence satisfactory to the Engineer on any of the foregoing points, he may be disqualified and the work awarded to the next low bidder so qualifying.

5. AWARD OF THE CONTRACT. The Owner, acting through its authorized representatives, will notify the successful bidder, in writing, within ninety (90) days after the date of receiving bids of its acceptance of this proposal. The Contractor shall complete the execution of the required Bond and Contract within fifteen (15) days of such notice.

6. ADDENDA. Bidders desiring further information or interpretation of the Plans or Specifications must make request for such information to the Engineer, prior to 48 hours before the bid opening. Answers to all such requests will be given in writing to all bidders in Addendum form, and all Addenda will be bound with, and made a part of, the Contract Documents. No other explanation or interpretation will be considered official or binding. Should a bidder find discrepancies in, or omission from the Plans, Specifications, or other Contract Documents, or should he be in doubt as to their meaning, he should at once notify the Engineer in order that a written Addendum may be sent to all bidders. Any addenda issued prior to 24 hours of the opening of bids will be mailed or delivered to each Contractor contemplating the submission of a proposal on this work. The proposal as submitted by the Contractor will be so constructed as to include any addenda if such are issued by the Engineer prior to 24 hours of the opening of bids.

7. BASIS FOR BID AWARD. If no alternates are specified in the bid proposal, award will be made to the lowest responsible, responsive bidder. However,the Owner reserves the right to reject any and all bids and to waive any irregularities as may be deemed best and in the Owner's interest.

8. TIME FOR COMPLETION. The time allowed for completion of all items of work shall be **Sixty (60)** consecutive calendar days, which time shall begin the tenth (10^{th}) day after issuance of the Work Order. The Work Order shall consist of a written request by the Engineer for the Contractor to proceed with the construction of the project.

9. LIQUIDATED DAMAGES FOR DELAY. The Contractor agrees that time is the essence of this Contract, and that for each day of delay beyond the number of calendar days herein agreed upon for the completion of the work herein specified and contracted for (after due allowance for such extension of time as is provided for in the General Conditions of Agreement) the Owner may withhold, permanently from the Contractor's total compensation, the sum of Five Hundred Dollars ($500.00) per calendar day or an amount equal to actual damages incurred by the Owner, whichever is greater, as stipulated damages for such delay.

10. RIGHTS OF VARIOUS INTERESTS. Wherever work being done by the Owner's employees or by other Contractors is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by the Engineer to secure the completion of the various portions of the work in general harmony.

11. CORPORATE CONTRACTS. Corporate contractors to be eligible to enter into contract with the Owner shall be qualified to do business in the State or States where the work is to be performed. All licensing requirements shall be complied with. Foreign corporations which have not domesticated or otherwise become licensed in the State or States where work will be performed shall obtain a permit to do business in such State or States pursuant to the State's requirements.

12. PROPOSALS. **Proposals must be submitted on forms purchased from the Owner's Engineer, A.L. Franks Engineering** and endorsed as provided in the Contract Documents.

Proposals must be submitted filled out with ink or typewriter and without erasure, interlineation or changes, and if not made in accordance with the General Conditions and other contract documents, will be subject to rejection as irregular, yet the Owner reserves the right to waive any irregularities.

Proposals will be made in the name of the principal and, in a co-partnership, the names of all partners shall be given. Exact post office address shall be given in all cases. If proposals are submitted by an agent, satisfactory evidence of agency authority must accompany the proposal.

13. IRREGULAR PROPOSALS. Proposals shall be considered irregular and may be rejected for the following reasons unless otherwise provided by law:

a. If the proposal form furnished to the Contractor by the Owner or the Owner's Engineer is not used or is altered;

b. If there are unauthorized additions or conditional bids, or irregularities of any kind which may tend to make the proposal incomplete, indefinite, or ambiguous as to its meaning;

c. If the bidder adds any provisions reserving the right to accept or reject any award, or to enter into a contract pursuant to an award;

d. If the unit or lump sum prices contained in the bid schedule are obviously unbalanced either in excess or below the reasonable cost analysis values;

e. If the bidder fails to insert a unit price for every pay item indicated except in the case of authorized alternate pay items;

f. If the bidder fails to complete the proposal in any other particulars where information is requested so bidder's proposal may be properly evaluated.

The Owner reserves the right to reject any or all bids and to waive irregularities as may be deemed best and in the Owner's interest.

14. RETURN OF BID SECURITY. Bid security of the lowest two or more bidders may be retained until a contract is executed or rejection made by the Owner. Other bid security will be returned only after the canvass and tabulation of bids is completed.

15. FAILURE TO EXECUTE CONTRACT. Should the successful bidder fail to execute the contract and furnish bonds satisfactory to the Owner to validate the same within fifteen (15) days after award of contract, his bid security shall be forfeited to the Owner as liquidated damages.

16. RIGHT-OF-ENTRY. Contractor shall provide the Owner, the Owner's Architect or Engineer, or representative of the Federal, State, County, District and Municipal governmental services proper facilities for access to the work wherever it is in preparation or progress.

17. PERMITS AND RIGHT-OF-WAY. The Owner will provide rights-of-way for the purpose of construction without cost to the Contractor by securing permits in areas of public dedication or by obtaining easements across privately owned property. It shall be the responsibility of the Contractor, forty-eight (48) hours prior to the initiation of construction on easements through private property, to inform the property owner of his intent to begin construction. Before beginning construction in areas of public dedication,

the Contractor shall inform the agency having jurisdiction in the areas forty-eight (48) hours prior to initiation of the work.

18. CONSTRUCTION IN PUBLIC ROADWAYS AND PRIVATE DRIVEWAYS. No public road shall be entirely closed overnight. It shall be the responsibility of the Contractor to build and maintain all weather by-passes and detours, if necessary, and to properly light, barricade and mark all by-passes and detours that might be required on and across the road involved in the work included in this contract.

The Contractor shall make every effort to complete construction and allow immediate access to adjacent property at all driveway entrances located along the roads. Owners or tenants of improvements where access and/or entrance drives are located shall be notified at least eight (8) hours prior to the time the construction will be started at their drive-ins or entrances and informed as to the length of time driveways will be closed, which period shall not exceed six (6) hours.

The Contractor shall be responsible for all road and entrance reconstruction, and repairs and maintenance of same for a period of one year from the date of such reconstruction. In the event the repairs and maintenance are not made immediately to the satisfaction of the Engineer, and it becomes necessary for the Owner to make such repairs, the Contractor shall reimburse the Owner for the cost of such repairs.

The Contractor shall at all times keep a sufficient width of the roadway clear of dirt and other material to allow the free flow of traffic. The Contractor shall assume any and all responsibility for damage, personal or otherwise, that may be caused by the construction along public roadways or private driveways.

19. REFERENCE SPECIFICATIONS. Where reference is made in these specifications to specifications compiled by other agencies, organizations or departments, such reference is made for expediency and standardization from the material supplier's point of view, and such specifications referred to are hereby made a part of these specifications. Any reference to standard specifications in any of the Contract Documents shall always imply the latest edition of said standard specification or specifications available at time notice inviting Contractors to bid is published unless otherwise stated.

20. TRADE NAMES AND MATERIALS. No material which has been used by the Contractor for any temporary purpose whatever is to be incorporated in the permanent structure without written consent of the Engineer.

Where materials or equipment are specified by a trade or brand name, it is not the intention of the Owner to discriminate against an equal product of another manufacturer, but rather to set a definite standard of quality of performance, and to establish an equal basis for the evaluation of bids. Where the words "equivalent", "proper",or "equal to" are used, they shall be understood to mean that the thing referred to shall be proper, the equivalent of, or equal to some other thing, in the opinion or judgment of the

Engineer. Unless otherwise specified, all materials shall be the best of their respective kinds and shall be in all cases fully equal to approved samples. Notwithstanding that the words "or equal to" or other such expressions may be used in the specifications in connection with a material, manufactured article or process, the materials, article or process specifically designated shall be used, unless a substitute shall be approved in writing by the Engineer, and the Engineer shall have the right to require the use of such specifically designated material, article or process.

21. QUALITY OF MATERIALS. In the absence of detailed specifications in other sections, all materials shall conform to the latest standards of the American Society for Testing Materials.

22. MATERIALS, SERVICES, AND FACILITIES. 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, equipment rental, water, heat, light, fuel, power, transportation, superintendence, temporary construction of every nature and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.

23. WORKMANSHIP, MATERIALS, EQUIPMENT, AND STORAGE. All work done and all materials and equipment furnished by the Contractor shall strictly conform to the plans, drawings, and specifications. Competent labor, mechanics, and tradesmen shall be used to supervise the installation of equipment as may be required by the Engineer. Any special tools or equipment which may be required for first class work shall be provided by the Contractor.

The acceptance at any time of materials by or in behalf of the Owner shall not be a bar to future rejection if they are subsequently found to be defective or inferior in quality or uniformity to the material specified, or are not as represented to the Engineer or Owner.

Contractor shall be responsible for the care and storage of materials delivered on the work site or purchased for use thereon. Stored materials shall be carefully and continuously protected from damage or deterioration and so located as to facilitate inspection by the Owner and Engineer. This responsibility for the care and storage of materials shall be with the Contractor whether such materials are furnished by the Contractor or by the Owner.

24. INSPECTION AND TESTING OF MATERIALS.

a. During the progress of the work, it shall be subject to the inspection and observance of the Engineer, and the contractor shall afford every reasonable facility and assistance to the Engineer to make such inspection thorough and intelligent. If any work is covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for examination at the Contractor's expense.

b. The fact that the Engineer is on the job site shall not be taken as an acceptance of the Contractor's work or any part of it. contractor shall notify the Engineer upon completion of his contract and the work shall be given final inspection by the Engineer and any tests shall be witnessed by the Engineer. If all parts of the work are acceptable and substantially comply with the intent of the plans, drawings, and specifications, a recommendation of final acceptance will be made by the Engineer to the Owner. If parts of the work are not acceptable and require additional work by the Contractor to complete the project, necessitating additional inspection by the Engineer, the cost of such additional inspections including time, travel, and lodging, shall be paid for by the Contractor to the Owner who will reimburse the Engineer.

c. Contractor shall submit to the Engineer seven (7) days in advance of construction, and without charge, samples or specifications of materials he proposes to use and shall not use these materials until he has received approval from the Engineer.

d. The Owner shall direct and furnish all items necessary for the testing of all materials called for in the specifications. The Owner shall pay the cost of the tests, including all transportation charges unless otherwise noted in the specifications. The cost of re-testing any failed specimens shall be paid by the Contractor.

e. All tests, unless otherwise provided, shall be in accordance with the pertinent sections of the latest edition of the standards applicable to the material or devices to be tested. A partial list of the principal societies referred to and their abbreviations follows:

ASTM	American Society for Testing Materials
AISC	American Institute of Steel Construction
ACI	American Concrete Institute
FS	Federal Specifications
AASHO	American Association of State Highway Officials
AWWA	American Water Works Association

f. All parts of the improvements shall conform to the standard of construction as given in detail under the various items, and in general to the intent thereof, and if they do not conform, shall be made to do so by rebuilding or replacing or otherwise as directed by the Engineer or Owner before acceptance shall be made.

25. BARRICADES, LIGHTS, AND WATCHMEN. Where the work is carried on in or adjacent to any street, alley or public place, the Contractor shall at his own cost and expense furnish and erect such barricades, fences, lights, and danger signals, shall provide such watchmen, and shall provide such other precautionary measures for the

protection of persons or property and of the work as are necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise the Contractor shall furnish and maintain at least one light at each barricade and sufficient number of barricades shall be erected to keep vehicles from being driven on or into any work under construction. The Contractor shall furnish watchmen in sufficient numbers to protect the work.

The Contractor will be held responsible for all damage to the work due to failure of barricades, signs, lights, and watchmen to protect it, and whenever evidence is found of such damage, the Engineer may order the damaged portion immediately removed and replaced by the Contractor at his cost and expense. The Contractor's responsibility for the maintenance of barricades, signs, and lights, and for providing watchmen shall not cease until the project shall have been accepted by the Owner.

The Contractor shall use only battery powered lights, enclosed lanterns or other lights satisfactory to the Engineer. Smudge pots or other lights which have an open flame will not be permitted.

26. DISPOSAL OF WASTE AND SURPLUS EXCAVATION. All trees, stumps, slashings, brush or other debris removed from the job site as a preliminary to the construction of the work or its appurtenances shall be removed from the property and disposed of in a manner approved by the Engineer.

All excavated earth in excess of that required for backfilling shall be removed from the job site and disposed of in a satisfactory manner except in locations where, in the judgment of the Engineer, it can be neatly spread over and along the right-of-way.

27. GUARANTY AGAINST DEFECTIVE WORK. The Contractor shall indemnify the Owner against any repairs which may become necessary to any part of the work performed under the contract, arising from defective workmanship or materials used therein, for a period of one (1) year from the date of final acceptance of the work.

28. RESTORATION OF SITE & CLEANUP. Upon completion of the project (0r major portions thereof) the Contractor shall restore the site to its original condition or better. Driveways and streets shall be compacted and resurfaced as originally found. All private property disrupted during construction including fences, patios, retaining walls, sidewalks, wooden decks, etc. shall be mended or repaired to their original condition. At the conclusion of the work, all tools, temporary structures and materials belonging to the Contractor shall be promptly removed, and all dirt, rubbish and other foreign substances shall be disposed of.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver over such materials and equipment in an undamaged, clean condition.

29. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE. The Contractor shall not commence work under this contract until he has obtained at his expense all

insurance required under this section of the General Conditions and by the Contract Documents, and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on any subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Such insurance shall remain in full force and effect on all phases of the work, whether or not the work is occupied or utilized by the Owner, until all work under the Contract is completed and has been accepted by the Owner.

Nothing contained in the insurance requirements shall be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from his operations under the Contract.

Any insurance bearing an adequacy of performance will be maintained after completion of the project for the full guarantee period.

The Contractor shall obtain and maintain for the full period of the Contract the following types of insurance in the form, minimum limits and amounts herein specified or as may be otherwise required in the Contract Documents. The Contractor shall automatically renew any policy which expires during the performance of his Contract and notify the Owner and Engineer of such a renewal prior to expiration date.

A. Workmen's Compensation including Occupational Disease, and Employer's Liability Insurance. Before commencement of the work, the Contractor shall take out and maintain during the life of this contract Statutory Workmen's Compensation Insurance and Occupational Disease Disability Insurance for all of his employees to be engaged in work under this Contract, and in case any work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation and occupational Disease Disability Insurance for the latter's employees engaged in such work unless such employees are covered by the protection afforded by the Contractor's insurance. In case any class of employees engaged in hazardous work under the Contractor is not protected under the Workmen's Compensation statute, or in case there is no applicable Workmen's Compensation Statute, the Contractor shall provide, and shall cause each subcontractor to provide adequate insurance for the protection of his employees not otherwise protected.

B. Public Liability and Property Damage Insurance: (Note "Indemnity" clause hereinafter). Before commencement of the work, the Contractor shall submit written evidence that he and all his subcontractors have obtained for the period of the Contract full Comprehensive General Liability and Property Damage Insurance coverage. This coverage shall protect the Contractor; the Owner; the Engineer, its architects and engineers; and each of their officers, agents and employees; from claims for damages for bodily or personal injury, sickness or disease, including death, and from claims for damages to property, which may arise directly or indirectly out of, or in connection with the performance of work under this Contract by the Contractor, by any of his Subcontractors, or by anyone directly or indirectly employed of either of them, or under the control of either of them, and the minimum amount of such insurance shall be as

follows unless higher minimum amounts are otherwise required in the Contract Documents:

> Public Liability Insurance in an amount not less than Two Hundred Fifty Thousand Dollars ($250,000) for damages arising out of bodily or personal injury, sickness or disease, or death of one person and subject to the same limit for each person and in an amount not less than Five Hundred Thousand Dollars ($500,000) in any one occurrence; and Property Damage Insurance in an amount not less than Three Hundred Thousand Dollars ($300,000) for all damages arising out of injury to or destruction of property of others in any one occurrence with an aggregate limit in the same amount.

The Property Damage portion of this coverage shall include where applicable explosion, collapse and underground exposure coverage. In addition, where Completed Operation Insurance coverage is applicable, such coverage will be maintained after completion and acceptance of the project for the full guarantee period.

C. Automobile Liability and Property Damage Insurance: Before commencement of the work, the Contractor shall submit written evidence that he and all his subcontractors have obtained Automobile Liability and Property Damage Insurance coverage on all self-propelled vehicles used in connection with the Contract, whether owned, non-owned, or hired. The liability limits shall be not less than Two Hundred Fifty Thousand Dollars ($250,000) for injury or death of one person and in an amount not less than Five Hundred Thousand Dollars ($500,000) in any one occurrence; and Property Damage limits of not less than Three Hundred Thousand Dollars ($300,000) in any one occurrence.

D. Contractual Liability Coverage: Each and every policy for Liability Insurance carried by each Contractor and Subcontractor will include a "Contractual Liability Coverage" endorsement sufficiently broad to insure the provision titled "Indemnity" hereinafter set forth.

E. Indemnity: The Contractor shall defend, indemnify and hold harmless the Owner; the Engineer, its Engineers; and each of their officers, agents, servants and employees; from any and all suits, actions, claims, losses or damage of any character and from all expenses incidental to the defense of such suits, actions or claims, based upon or arising out of or alleged to be based upon or arising out of (1) any injury, disease, sickness or death of any person or persons, (2) any damages to any property including in part loss of use thereof, caused by any act or omission of the Contractor, of any Subcontractor of the Contractor, or by their officers, agents, servants, employees, or anyone else under the Contractor's direction and control, and arising out of, occurring in connection with, resulting from, or caused by the performance or failure of performance of any work or services called for by the Contract or from conditions created by the performance or non-performance of said work or services, but not including the sole negligence of any party herein indemnified.

F. Builder's Risk "All-Risk" Insurance: In addition to such Fire and extended Insurance coverage which the Contractor or his Subcontractors elect to carry for their own protection, the Contractor, before commencement of the work, shall effect and maintain for the life of his Contract Builder's Risk "All-Risk" Completed Value Insurance coverage upon the full insurable value of all portions of the project which is the subject of this Contract and subject to a loss for which Builder's Risk "All-Risk" Insurance coverage gives protection, and shall include completed work and work in progress. This coverage shall be with an insurance company or companies acceptable to the Owner.

Such insurance shall include as Additional Named Insureds: the Owner; The Engineer, its architects and engineers; and each of their officers, agents, and employees; and any other persons with an insurable interest designated by the Owner as an Additional Named Insured.

Duplicate originals of the policy of insurance required herein shall be furnished to the Engineer as provided under "Evidence of Insurance Coverage" hereinafter.

G. Evidence of Insurance Coverage: Before commencement of any work, the Contractor shall submit written evidence that he and all his Subcontractors have obtained the minimum insurance required by the Contract Documents. Such written evidence shall be in the form of a Certificate of Insurance (see attached form) executed by the Contractor's insurance carrier showing such policies in force for the specified period or by furnishing a copy of the actual policy or policies. Each policy or certificate will bear an endorsement or statement waiving right of cancellation or reduction in coverage without ten (10) days notice in writing to be delivered by registered mail to the owner.

The Contractor shall furnish duplicate originals of Builders' Risk "All-Risk" Completed Value Insurance coverage to the Engineer, one copy of which shall be for the Owner and one copy for the Engineer.

30. SAFETY.

a. In accordance with generally accepted construction practices, the Contractor alone will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours.

b. The duty of the Engineer or Architect to conduct construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures, in, or on, or near the construction site.

31. EXISTING UTILITIES AND SERVICE LINES. The Contractor shall be responsible for the protection of all existing utilities or service lines crossed or exposed by his construction operations. Where existing utilities or service lines are cut, broken or damaged, the Contractor shall replace or repair the utilities or service lines with the same type of original material and construction, or better, at his own cost and expense.

32. DURING CONSTRUCTION. During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris, and rubbish as is practicable and shall remove same from any portion of the site, if in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

33. COPIES OF PLANS AND SPECIFICATIONS FURNISHED. Three (3) sets of plans and specifications shall be furnished to the Contractor, at no charge, for construction purposes. Additional copies may be obtained at cost of reproduction upon request.

34. LIGHT AND POWER. The Contractor shall provide, at his own expense, temporary lighting and facilities required for the proper prosecution and inspection of the work.

35. EXISTING STRUCTURES. The plans show the locations of all known surface and subsurface structures. However, the Owner assumes no responsibility for failure to show any or all of these structures on the plans, or to show them in their exact location. It is mutually agreed that such failure shall not be considered sufficient basis for claims for additional compensation for extra work or for increasing the pay quantities in any manner whatsoever, unless the obstruction encountered is such as to necessitate changes in the lines or grades, or requires the building of special work, provisions for which are not made in the plans and proposal, in which case the provisions in these specifications for extra work shall apply.

36. USE OF EXPLOSIVES. Use of explosives will be allowed only upon written approval of their use by the Engineer.

Should the Contractor elect to use explosives in the prosecution of the work, the utmost care shall be exercised so as not to endanger life or property. The Owner shall not be held liable for damages done by the Contractor in the use of explosives. The Contractor shall notify the proper representatives of any public service corporation, any company, or any individual, not less than eight (8) hours in advance of the use of explosives which might endanger or damage their or his property along or adjacent to the work. Whenever explosives are stored or kept, they shall be stored in a safe and secure manner and all storage places be plainly marked "DANGER EXPLOSIVES", and shall be under the care of a competent watchman at all times.

37. SUNDAYS, HOLIDAYS, AND OVERTIME. Any work necessary to be performed after regular working hours, on Sundays, or legal holidays, shall be performed without additional expense to the Owner. The Contractor shall notify the Engineer if any work is to be performed on Sundays or holidays.

38. PAYMENTS NO EVIDENCE OF PERFORMANCE. No progress or final estimate certificate given or payment made under this contract shall be evidence of the performance of this contract or construed to be acceptance of defective work or improper materials, either wholly or in part.

39. TEMPORARY SUSPENSION OF THE WORK. The Engineer shall have authority to suspend the work wholly or in part for such period or periods of time as he may deem necessary due to unsuitable weather or other conditions considered unfavorable for the suitable prosecution of the work; or for the failure of the Contractor to carry out instructions or to perform any provisions of the contract. During periods of suspension, the Contractor shall properly protect the work from possible injury.

40. OWNER'S RIGHT TO DO WORK. If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this contract, the Owner, after seven (7) days written notice to the Contractor, may, without prejudice to any other remedy the Owner may have, make good such deficiency and may deduct the cost thereof from the payment then or thereafter due the Contractor. Any money due the Owner after such deduction shall be paid by the Contractor or his sureties who hereby agree to these provisions.

41. RIGHT OF OWNER TO TERMINATE CONTRACT. Should it appear at any time that the work is not being prosecuted with sufficient competence or rapidity to insure the proper completion of the work within the stipulated time, and, if upon seven (7) days written notice to the Contractor, he fails to increase the quality or the quantity of his work, or both, the Owner reserves the right to annul and cancel this contract and relet the work or any part thereof, or at the Owner's option to complete it by day labor. The Contractor shall not be entitled to any claims for damages on account of such annulment, and he will be held liable for costs and expenses incurred in reletting or completing the work under this contract. All money due the Contractor will be retained until the work is completed and all expenses and costs have been deducted and any money due the Owner, after such deductions have been made, shall be paid by the Contractor or his Sureties who hereby agree to these provisions.

42. TERMINOLOGY. Throughout these specifications, the word "shall" denotes mandatory. The word "may" implies only permission. All other "terms" or "word phrases" shall be interpreted as having the meaning customarily ascribed to them by the several building trades of the United States.

43. CERTIFICATES AND GUARANTEES. Four (4) copies of any manufacturer's guaranty or certificate as may be required by the Contract Documents shall be submitted to the Owner prior to the acceptance of the work by the Owner.

44. COORDINATION WITH OTHERS. In the event other contractors are doing work in the same area simultaneously with this project, the Contractor shall coordinate his proposed construction with that of the other contractors.

45. DEWATERING EXCAVATION. The prospective bidders shall make sufficient subsurface explorations to determine the location of groundwater which might be encountered. The Contractor shall, at his own expense, utilize a pumping system in order to place materials in dewatered excavations.

46. PUBLIC UTILITIES AND OTHER PROPERTY TO BE CHANGED. In case it is necessary to change or move the property of any owner or of a public utility, such property shall not be moved or interfered with until ordered to do so by the Engineer. The right is reserved to the owner of public utilities to enter upon the limits of the project for the purpose of making such changes or repairs of their property that may be made necessary by performance of this Contract.

Any time the Contractor intends to expose, cross, or otherwise work in the area of the existing petroleum pipelines, telephone lines, water lines, etc., the Contractor shall notify the Owner(s) of the respective facilities forty-eight (48) hours in advance.

47. PAY ITEMS. Pay items are listed in the Proposal. All other items necessary to complete the work as shown and specified shall be considered subsidiary obligations of the Contractor.

48. MUTUAL RESPONSIBILITY OF CONTRACTORS. If, through acts or neglect on the part of the Contractor, any other Contractor or Subcontractor shall suffer loss or damage to his work, the Contractor agrees to settle with such other Contractor or Subcontractor by agreement or arbitration, if such other Contractor or Subcontractor will so settle. If such other Contractor or Subcontractor asserts been so sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against such claims and for any costs in connection with such claims.

49. PROTECTION OF PROPERTY. The Contractor shall, at no additional expense to the Owner, protect by false work, braces, shoring or other property along his line of work or affected directly by his work, against damage and shall repair the damages or repay the injured Owners if such damage occurs.

The Contractor shall exercise care to protect from injury all water pipes, sanitary sewer pipes, gas mains, telephone cables, electric cables, service pipes, and other utilities or fixtures which may be encountered during the progress of the work. All utilities and other service facilities or fixtures if damaged, shall be repaired by the Contractor without additional compensation.

The Contractor shall personally check and verify utility information on the plans. Where existing utilities or structures are shown on the plans or drawings, they are believed to be accurate but are not guaranteed to such or that these are the only utilities or structures in the construction area. Protection is Contractor's responsibility and he must satisfy himself as to the existence and location of all utilities and structures.

The Contractor shall give notice in writing at least 48 hours before breaking ground, to all persons, superintendents, inspectors, or those otherwise in charge of property, streets, water pipes, gas pipes, sewer pipes, telephone cables, electric cables, railroads or otherwise, who may be affected by the Contractor's operation, in order that they may remove any obstruction for which they are responsible and have a representative on the ground to see that their property is properly protected.

50. EXTENSION OF CONTRACT PERIOD. The Contractor may be granted an extension of time due to Acts of God, Acts or War, Strikes, or non-delivery of materials provided he submits a request in writing to the Engineer not later than ten (10) days from the date of such occurrence. A separate request must be made for each occurrence. Normal rain days as specified by the U. S. Army Corps of Engineers will not be considered in any extension.

51. FAILURE TO COMPLETE WORK WITHIN CONTRACT PERIOD. If the Contractor fails to complete his work within the contract period, or any extension thereof, as provided in the "Extension of Contract Period" said contract shall upon written notice to the Contractor and Surety be in default.

The Owner may, at its (his) option, permit the Contractor or his surety to complete the work included in the contract, or may proceed to complete the work in accordance with "Completion of Contract in Default". In either event, the Contractor or his Surety shall be responsible for all costs incidental to the completion of the work and also for the liquidated damages stipulated in the proposal form. The Owner may waive such portion of the liquidated damages as may occur after the work is in condition for the safe and convenient use by the Owner.

52. CONTRACTS IN DEFAULT. The Owner may declare a contract in default for any one or more of the following reasons:

a. Failure to complete the work within the contract period or any extension thereof.

b. Failure or refusal to comply with an order of the Engineer or Architect within a reasonable time.

c. Failure or refusal to remove rejected materials.

d. Failure or refusal to perform anew any defective or unacceptable work.

e. Bankruptcy or insolvency, or the making of an assignment for the benefit of creditors.

f. Failure to provide a qualified superintendent, competent workmen or subcontractors to carry on the work in an acceptable manner or failure to prosecute the work according to the agreed schedule of completion.

g. Disregard or violation of any other important provisions of the Contract Documents as determined by the Engineer.

53. COMPLETION OF CONTRACTS IN DEFAULT. If for any reason, a contract is declared in default, the Owner shall have the right, without process or action at law to take over all or any portion of the work and complete it at its (his) option, either by day labor or by reletting same. Written notice shall be given the Contractor by the Owner that his contract has been declared in default and upon receiving such notice, the Contractor shall peaceable relinquish possession of said work or the parts thereof specified in the notice.

The Owner may, at its (his) option and at a rental which it considers reasonable, retain all materials, equipment, and tools on the work until the work is complete.

Neither the Owner nor the Owner's officers, agents, or employees shall be in any way liable or accountable to the Contractor or his Surety for the method by which the completion of the said work, or any portion thereof, may be accomplished, or for the price paid therefor. Should the cost of completing the work be in excess of the original contract price, the Contractor and his Surety shall be held responsible for such excess cost. Should the cost of such completion including all proper charges, be less than the original contract price, the amount so saved shall be paid to the Contractor. Neither by taking over the work nor by declaring the contract in default shall the Owner forfeit the right to recover damages from the Contractor or his Surety for failure to complete the entire contract. Maintenance of the work shall continue to be the Contractor's and Surety responsibilities as provided for in the Bond and Guaranty of the Contractor.

54. EXCAVATION IN HIGHWAY RIGHTS-OF-WAY. No trench excavation within a highway right-of-way shall be carried closer than 10 feet of all pavement edges. No dirt from trench excavation shall be piled on roadway shoulders, slopes, ditches, and berms shall be restored to their original condition.

The Contractor shall notify the Highway Department of his construction schedule not less than five (5) days prior to commencing the work within the right-of-way. The Contractor shall conform to the requirements of the Arkansas Highway Department as to details of construction methods and time of construction.

55. PROVISIONS FOR REROUTING AND DETOUR OF TRAFFIC. The Contractor will be required to furnish all barricades, lights, signs, and flagmen where it becomes

necessary to reroute traffic during the time construction is in progress in the City streets or highways. The detour will be determined by the Engineer and approved by the Owner and the Arkansas Highway Department.

56. REMOVAL AND REPLACEMENT OF EXISTING PIPE CULVERTS. Existing pipe culverts in conflict with the proposed construction shall be unearthed carefully, disjointed, and stockpiled adjacent to the right-of-way. The pipe culverts shall be cleaned and replaced immediately after the line construction is clear so as to cause no serious inconveniences to the property owners and to allow access to their property as quickly as possible. Pipe culverts shall be laid to grade on a firm bedding and shall be backfilled and mechanically tamped to a density such that settlement will not occur. Where existing rubble or concrete headwalls are cut, damaged, or removed, they shall be replaced in an equal or better condition as determined by the Engineer.

Removal and replacement of existing pipe culverts will not be measured and paid for each. No separate payments will be made for removing and replacing headwalls on culverts and all costs in connection therewith shall be included in other items listed in the Proposal.

57. SCHEDULE OF WORK SEQUENCE. Upon award and prior to any construction, it shall be the responsibility of the Contractor to present, to the Owner and Engineer for approval, a tentative schedule of the sequence in which the work will be performed. The schedule should include the following information:

a. The sequence of work in which the construction will be done.

b. The approximate period of time in constructing and testing of the facilities.

c. Coordination of work using two (2) or more crews.

d. Schedule of possible night work in making tie-ins and road crossings.

58. COST BREAKDOWN. Immediately after being awarded a contract for the work, the Contractor shall furnish the Engineer with a cost breakdown of each lump sum bid. Such a breakdown shall be in sufficient detail to permit its use in the preparation of progress estimates by the Engineer. Progress payments for materials and equipment on hand shall be based on invoice prices and invoice copies must be presented to the Engineer.

59. FINAL FIELD TESTS. Upon completion of the work and prior to final payment, all equipment and appliances installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other material, equipment, and instrument necessary for all acceptance tests, at no additional cost to the Owner.

60. WATER FOR CONSTRUCTION. Water used for testing and flushing of the pipe line or any other purpose incidental to this project will be furnished by the Contractor. The Contractor shall make the necessary arrangements for securing and/or transporting such water and shall take such water in a manner and at such times that will not produce a harmful drain on the source of water. The Contractor shall be fully responsible for the draining and disposal of all water used in flushing and testing. The Contractor shall obtain approval of the Owner and Engineer of the manner in which the water will be drained and disposed of.

61. ELECTRICITY FOR CONSTRUCTION. Except as provided elsewhere in these specifications, the Contractor shall provide all electricity required.

62. SPECIAL CONSTRUCTION REQUIREMENTS IN STATE HIGHWAY RIGHT-OF-WAY.

a. All Highway signs removed or disturbed shall be restored to original condition.

b. All surplus material shall be removed from right-of-way and the excavation finished flush with surrounding natural ground.

c. Operation along highways shall be performed in such a manner that all excavated materials be kept off the pavements at all times as well as all operating equipment.

d. Barricades, warning signs and flagmen shall be provided by the Contractor.

63. CONTRACT DOCUMENTS. The Contract Documents shall consist of all documents contained herein as stated in the Table of Contents including the Notice to Bidders (Advertisement), Special Conditions, Instructions to Bidders, Proposal, signed Agreement. Performance and Payment Bonds (when required), Special Bonds (when required), General Conditions of Agreement, Technical Specifications, Plans, and all modifications thereof incorporated in any of the documents before the execution of the Agreement.

64. POLES, SIGNS, GUY WIRES, ETC. All utility poles, guy wires, private sign posts, signs, and similar private obstructions which interfere with the construction of this project will be removed and replaced by the Contractor at his own expense.

The removal and replacement of City street sign posts and signs is the responsibility of the Contractor. The Contractor shall be responsible for all damage to street sign posts and signs within the limits of his operations that remain in place or are removed and replaced.

In event street sign posts and signs are injured or destroyed by the Contractor's operations, they shall be replaced by the Contractor. No separate compensation will be paid for this work, but the costs thereof shall be included in such contract pay items as are provided.

65. PROTECTION OF TREES, PLANTS AND SHRUBS. The Contractor shall make every effort to protect all trees, plants, and shrubs encountered during construction and shall notify property owners, as specified above, before removal of any such item. In all cases where questions arise, the Contractor shall request clarification from the Engineer.

66. PROPERTY LINES AND MONUMENTS. The Contractor shall protect all property lines, monuments and stakes encountered in his work. All monuments, and stakes for later use, that are disturbed or destroyed by the Contractor shall be replaced at his expense.

67. CONFINED SPACE ENTRY. The Contractor shall be responsible for compliance with any and all Federal and State confined spaced entry and permitting requirements.

TECHNICAL SPECIFICATIONS

118 E. Broad Street
Texarkana, AR 71854
(870) 216-1906
FAX (870) 216-1907

TABLE OF CONTENTS

SECTION 1

GENERAL

1.01 GENERAL: To provide a fully automatic caustic soda feed system that provides an accurate continuous analysis of the alkalinity of the wastewater influent.

1.02 SCOPE OF WORK: The work to be done hereunder includes the furnishing of all labor, material, transportation, tools, supplies, equipment and appurtenances, necessary for the complete and satisfactory construction of the proposed PIPING, CUSTIC SODA FEED SYSTEM, FIRBERGLASS BUILDING AND ELECTRICAL.

1.03 PERMITS, CERTIFICATES, LAWS, AND ORDINANCES: The Contractor shall at his own expense, procure all permits, certificates and licenses required of him by law for the execution of his work. He shall comply with all federal, state, or local laws, ordinances or rules and regulations relating to the performance of the work.

1.04 LOCATION: The improvements described herein are to be on property as shown on location map for the proposed site.

1.05 BOUNDARIES OF WORK: The Owner shall provide land for the work specified in this Contract and shall make suitable provisions for ingress and egress and the Contractor shall not enter on or occupy with men, tools, equipment or materials any ground outside the property of the Owner without written consent of the Owner of such ground. Other Contractors and employees or agents of the Owner may for all necessary purposes enter upon the work and premises used by the Contractor and the Contractor shall conduct his work so as not to impede unnecessarily any work being done by others on or adjacent to the site.

1.06 SITE CLEARING & RESTORATION:

A. Excepting as otherwise provided herein, the Contractor shall protect all structures, such as walks, pipelines, headworks, asphalt paving during the progress of his work; shall remove from the site all cuttings, drillings, debris and unused materials; and shall, upon completion of the work, restore the site as nearly as possible to its original condition, including the replacement at the Contractor's sole

expense, of any facilities which have been damaged beyond restoration to its original condition or destroyed.

D. The replacements of grass that is disturbed by the Contractor while constructing the improvement. Disturbed grass shall be replaced by solid sodding, using the same kind of grass as existing in the undisturbed portion of the project.

E. The reconstruction of dirt and gravel roads or drives. The alignment and grade shall be restored, as close as possible, to that existing prior to construction.

F. The removal and subsequent replacement of sidewalks, curbs, curb and gutter and other related items which are displaced by the Contractor's operations. The Contractor shall furnish new materials necessary to permit replacement to a condition better than or equal to that existing prior to construction.

G. Payment: No separate payment shall be made for any of the items listed in this section, but shall be considered subsidiary to other items for bid.

SECTION 3

PIPING INSULATION

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

1.02 THIS SECTION NOT USED

1.04 REFERENCES

A, ASTM C195 - Mineral Fiber Thermal Insulation Cement.

B. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.

C. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.

D. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

E. ASTM C547 - Mineral Fiber Preformed Pipe Insulation.

F. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

G. ASTM E84 - Surface Burning Characteristics of Building Materials.

H. ASTM E96 - Water Vapor Transmission of Materials.

I. NFPA 255 - Surface Burning Characteristics of Building Materials.

J. UL 723 - Surface Burning Characteristics of Building Materials.

1.05 SUBMITTALS

A. Product Data: Provide product description, list of materials and thickness for each service, and locations.

B. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84. NFPA 255. UL 723.

1.07 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this section with minimum three years experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Store insulation in original wrapping and protect from weather and construction traffic.

C. Protect insulation against dirt, water, chemical, and mechanical damage.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2. PRODUCTS

2.01 GLASS FIBER

A. Manufacturers:
   1. Knauf
   2. Owens Corning
   3. BriskHeat: SpeedTrace-Self Regulating Heating Cable

B. Insulation: ASTM C547; rigid molded, noncombustible.
   1. 'K' ('ksi') value: ASTM C335, 0.25 at 75 degrees F (0.035 at 24 degrees C).

   2. Minimum Service Temperature: -20 degrees F (-28.9 degrees C).

   3. Maximum Service Temperature: 300 degrees F.

   4. Maximum Moisture Absorption: 0.2 percent by volume

C. Vapor Barrier Jacket
   1. ASTM C921, White kraft paper reinforced with glass fiber yard and bonded to aluminized film.
   2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
   3. Secure with self sealing longitudinal laps and butt strips.
   4. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Tie Wire: 18 gauge stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive
   1. Compatible with insulation.

F. Insulation Cement/Mastic
   1. ASTM C195; hydraulic setting on mineral wool.

G. Fibrous Glass Fabric
   1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
   2. Blanket: 1.0 lb/cu ft (16 kg/cu m) density.

H. Indoor Vapor Barrier Finish
   1. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.02 FLEXIBLE FOAM

A. Manufacturer:
   1. Armaflex

PART 3. EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

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

B. On exposed piping, locate insulation and cover seams in least visible

locations.

C. Insulated cold pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory applied or field applied.

   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.

   3. Finish with glass cloth and vapor barrier adhesive.

   4. PVC fitting covers may be used.

   5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.

   6. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

D. For insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.

   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.

   3. Finish with glass cloth and adhesive.

   4. PVC fitting covers may be used.

   5. For hot piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevell and seal ends of insulation.

E. Inserts and Shields:
   1. Application: Piping 1-1/2 2 inches (40 50 mm) diameter or larger.

   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.

   3. Insert Location: Between support shield and piping and under the finish jacket.

   4. Insert Configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.

5. Insert Material: ASTM C640 cork hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

F. Finish insulation at supports, protrusions, and interruptions.

G. For pipe exposed in finished spaces below 10 feet (3 meters) above finished floor, finish with canvas jacket sized for finish painting.

3.03 TOLERANCE

A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.04 GLASS FIBER INSULATION SCHEDULE

PIPING SYSTEMS	THICKNESS/Inch
1. Plumbing Systems	
Domestic Hot Water Supply	½
Domestic Cold Water	1
2. Cooling Systems	
Refrigerant Suction	1
Refrigerant Hot Gas	1

END OF SECTION

SECTION 4

CONCRETE FORMWORK

4.01 SCOPE: Work in this section includes all labor, plant and material necessary to furnish and install all concrete formwork required by the project. Concrete formwork shall conform to all requirements of ACI 301 "Specifications for Structural Concrete for Buildings" and ACI 318 "Building Code Requirements for Reinforced Concrete" and ACI 347 "Recommended Practice for Concrete Formwork" except as modified herein.

4.02 MATERIALS:

A. Forms shall be of wood, metal, highly water resistant plywood, or other material approved by the Engineer. Forms for sections greater than 18" thick shall be of wood. Form surfaces shall be smooth and free from irregularities, dents, sags, or holes when used for permanently exposed surfaces. Bolts and rods used for internal ties shall be so arranged that, when the forms are removed, all metal will not be less than two (2) inches from any concrete surface. Wire ties will not be permitted where concrete surface will be exposed to weathering, and discoloration would be objectionable. Exposed concrete shall have approved form liners of masonite or plywood, or shall be constructed of smooth surfaced plywood.

B. Corner forms forming ½ inch chamfers or as otherwise specified on plans, shall be used on all outside corners that are to be exposed in the finished structure. Chamfer forms shall be molded plastic or polyvinyl chloride radius of chamfer strips. Use one style of form throughout the project.

C. Rustication and Score Line Strips shall be a non-absorbent material such as extruded polyvinyl chloride, plastic, fiberglass or metal or they may be milled from good quality lumber and well sealed to prevent moisture absorption, wood strips may not have protruding splinters which may become embedded in the concrete. Sealing wood shall be accomplished by immersion or brushing on two coats of form coating.

D. Form ties for concrete shall have an approved waterstop barrier to prevent seepage of moisture along the ties. The ends of the tie metal after breaking off shall be minimum of 1½ inches from the finished wall face. Submit samples to the Engineer for review.

4.03 EXECUTION: Forms shall be built true to line and grade, and be mortartight and sufficiently rigid to prevent displacement or sagging between supports. All formwork and shoring shall be designed for the construction loads to be placed on them, and the design and construction of said forms shall be in accordance with ACI Standard "Recommended Practice for Concrete Formwork (ACI 347). The structural adequacy of the formwork shall rest with the Contractor. All forms shall be so constructed that they can be removed without hammering or prying against the concrete. Forms shall not be removed without approval of the Engineer. Forms shall not be removed before the minimum times given below, or longer if job control tests indicate the concrete has not attained strength specified below, except when specifically authorized by the Engineer.

Beams and Slabs	14 days
Walls up to 12" Thick and Vertical Surfaces	3 days
Columns	5 days
Walls greater than 12" Thick	7 days

In general, forms or shores for supported slabs and beams shall not be removed until the concrete, so supported, has acquired 70% of its design strength; except where loads other than the dead weight of the concrete are added, the shores shall not be removed until 24 hours after the concrete has obtained 90% of its design strength. Forms shall be removed immediately after expiration of the lapsed time specified above or sooner, if required by the Engineer, where concrete is to receive a rubbed finish.

4.04 PAYMENT: No separate payment shall be made for any item listed in this section, but shall be considered subsidiary to the price for other items.

SECTION 5

STEEL REINFORCEMENT

5.01 MATERIAL: Steel reinforcement shall conform to the "Specification for Deformed Billet Steel Bars for Concrete Reinforcement" ASTM A615, Grade 40.

Wire fabric reinforcement shall conform to the current "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement", ASTM A-185, or "Specifications for Welded Deformed Steel Wire Fabric for Concrete Reinforcement", ASTM A-497.

5.02 STORAGE: Reinforcement shall be stored above the ground surface upon skids, platforms or other supports and shall be protected from mechanical injury and surface deterioration by exposure to the weather.

5.03 SPLICES: No splices of bars, except when shown on the Plans, will be permitted without the approval of the Engineer. Bars shall be rigidly clamped or wired at all spices in a manner approved by the Engineer. Welding may not be used except with the specific approval of the Engineer. Welding, when approved, shall conform to the American Welding Society's "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction" (AWS D12.1). Welded wire fabric shall be lap spliced a minimum of 2 inches plus the bar spacing. Splices in reinforcing bars shall conform to the general requirements of the ACI Code, except ring tension reinforcement splices, which should be a minimum of 40 bar diameters. Splices should be staggered where possible or increased by 30%.

5.04 DETAILING & FABRICATION: Furnish Shop Detail and Field Placing Drawings for all reinforcing steel for approval of the Engineer. Shop Drawings shall include reinforcing, placing plans and details indicating size, location, arrangement, splice locations, bending diagrams, placing sequence, etc. Placing Drawings shall be insufficient detail to allow field personnel to accurately place reinforcing. Shop and Placing Drawings shall be prepared in accordance with "Manual of Standard Practice for Detailing Reinforced Concrete Structures" ACI 315-65, current edition.

Reinforcement bars shall be bent cold to the shapes indicated on the Plans. Fabrication tolerances, fabrication, and detailing of steel

reinforcement shall conform to the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI-315).

Steel reinforcement shall be of the type and size, cut to lengths and bent to shapes as indicated on the Plans. Unless otherwise indicate, hooks, laps, splices, embedment lengths, and other details of reinforcement shall be provided as set forth in the ACI Building Code (ACI-318) to develop the full tensile strength of the bar.

5.05 PLACING REINFORCEMENT: Metal reinforcement at the time concrete is placed shall be free from mud, oil, paint, excessive rust and excessive mill scale or any other coating that would destroy or reduce its bond with the concrete.

Metal reinforcement shall be accurately positioned and dimensioned in accordance with the Plans and Specifications. The bars and mesh shall be tightly secured against displacement by ties of annealed wire, or suitable clips at intersections. Wall reinforcement shall be supported and held securely against displacement in its proper position clear of the forms as indicated on the Plans. Placing tolerances shall conform to ACI-318.

Nails shall not be driven into the wall forms to support reinforcement nor shall any other device used for this purpose come in contact with the form on the waterside of any water containing structure. Metal devices used to provide the required clear distances from reinforcing steel to waterside of concrete surfaces shall be galvanized, or shall be as approved by the Engineer.

The main reinforcement of slabs in contact with the ground shall be supported in its proper position, as indicated on the Plans, by means of precast cement mortar blocks, of approved dimensions, resting on the slabs' subbase. Such precast blocks shall be made of mortar composed of 1 part cement to 2 parts sand. Blocks shall be spaced at the intervals required to maintain the reinforcement in its required position in the slab during the placing of the concrete. The slab reinforcement shall not be used to support planking or runways used in placing concrete.

Bending of bars embedded in hardened concrete will not be permitted except when specifically approved by the Engineer for the field condition encountered.

In the case of floor slabs, galleries, deck slabs, and beams, metal chairs, spacers and other metal accessories necessary to provide the required clear distances and proper alignment and spacing between bars shall be galvanized or shall have plastic protective covering over portions in contact with forms.

5.06 CONCRETE PROTECTION FOR REINFORCEMENT: Steel reinforcement shall be placed and held in position so that the concrete cover, as measured from the surface of the bar shall be the following, except as otherwise shown, specified, or directed:

Slabs:

1½ inches, in general, top and bottom.
1½ inches at surfaces troweled as floor finish, walkway, or driveway.
2 inches on bottom for slabs over water and where exposed to the weather.

Footings:

2 inches at top of footings.
3 inches at bottom, sides, and end of footings.

Walls:

2 inches on surfaces against earth.
1 inch on interior surfaces.
2 inches on interior surfaces contacting water.

Beams and Girders in Contact with Water:

2 inch minimum to stirrup steel.
2½ inch minimum to main longitudinal steel.

Columns:

2 inches, in general, to main vertical reinforcement.
2½ inches, to main reinforcement on surfaces in contact with water.

Beams and Girders:

1½ inch minimum to stirrup steel.
2 inches minimum to longitudinal Steel.

5.07 PAYMENT: No separate payment shall be made for any item listed in this section, but shall be considered subsidiary to the price for other items.

SECTION 6

CAST-IN-PLACE CONCRETE

6.01 GENERAL:

A. Standards: Concrete work shall conform to all requirements of ACI-30l "Specifications for Structural Concrete for Buildings" ACI-318 "Building Code Requirements for Reinforced Concrete" ACI-350 "Concrete Sanitary Engineering Structures", and ACI 305 and 306 "Recommended Practice for Hot (Cold) Weather Concreting", and the provisions of these specifications.

B. Scope: Work consists of furnishing all plant, labor, materials, equipment, and appliances, and performing all operations in connection with installation of the concrete work, complete, in strict accordance with the Specifications and Drawings.

C. Inspection: Embedded items must be inspected and tests for concrete and other materials shall have been completed and approved by the Engineer before concrete is placed.

6.02 MATERIALS: All concrete materials shall conform to the latest revised ASTM Designations listed below:

A. Coarse Aggregate shall consist of gravel, crushed gravel, crushed stone, air-cooled blast furnace slag, or a combination thereof, conforming to ASTM C-33 with a maximum size of 1½".

B. Fine Aggregate shall conform to ASTM C-33 and shall be washed river sand composed of clean, uncoated grains of strong materials.

C. Cement shall be Portland cement conforming to ASTM Specification C-150, Type I, Type IA, Type III, or Type IIIA. Only one brand of cement shall be used for exposed concrete.

D. Water: Clean, fresh and free from oil, acids, alkali, vegetable, sewage, organic or other deleterious matter.

E. Admixtures: A cement reducing admixture conforming to ASTM C-618 will be used for all concrete at the Contractor's option. Concrete mix designs shall include the admixture, should this option be exercised.

Admixture shall be a cement dispersing agent used in conformance with manufacturer's directions. The dispersing agent used shall be subject to the approval of the Engineer. Contractor shall notify Engineer in writing that he is taking this option.

A retarding admixture, conforming to ASTM C-494, pretested with job materials under job conditions, shall be used, if approved, whenever necessary to prevent cold joints due to the quantity of concrete placed, to permit revibration of the concrete, to offset the effects of high concrete temperature, or to reduce the maximum temperature and rate of temperature rise.

F. Premolded Expansion Joint Filler Strips shall be non-extruding type conforming to the current AASHTO Designation M153.

G. Abrasive Aggregate shall be equal to fine (c.f.) "Alundum" aggregate as manufactured by Norton Company, Worcester, Mass. or "Frictex NS" as manufactured by Sonneborn-Contech.

H. Curing Compound: Concrete curing compound shall be of a nature and composition not deleterious to concrete and shall be of a standard and uniform quality ready for use as shipped by the manufacturer. At the time of use, the curing compound shall be in a thoroughly stirred condition. Curing compounds shall not be diluted by the addition of solvent or thinners, or be altered in any manner without the specific approval of and in a manner prescribed by the manufacturer. Curing compound shall conform to the requirements of ASTM C309 Type 1.

The curing compound shall be sufficiently transparent and free from color that there will be no permanent change in the color of the concrete. The compound shall contain, however, a temporary dye of sufficient color to make the membrane clearly visible for a period of at least four hours after application.

I. Cement Grout: **All grouting and sealant materials which will be used in areas which are exposed to the potable water shall be NSF 60.**

Cement based grout shall be used for grouting work except as otherwise specified.

(1) Quality: Grout shall be composed of cement, sand, admixtures and water proportioned and mixed as hereinafter specified.

(2) Cement: Cement for grout shall be Type I normal Portland cement conforming to the specifications for cement in concrete. Type III high early strength Portland cement may be used only when approved by the Engineer.

(3) Sand: Sand shall conform to ASTM C33 and shall be graded so that 100% by weight will pass a standard No. 8 mesh sieve, and at least 45% by weight will pass a standard No. 40 mesh sieve.

(4) Design Mix: Grout shall be a mixture of one part cement to two parts sand with a water cement ratio of 0.55. Drypack grout shall be a mixture of one part cement, two parts sand and the minimum amount of water required for mixing and placing. When shrinkage control of standard grout is required, aluminum powder shall be added as herein specified.

(5) Mixing: Mixing and placing apparatus shall be similar to that specified for concrete. Grout shall be mixed for a period of at least one minute. Diluted grout shall be agitated from time to time as considered necessary to keep the ingredients well mixed and in suspension. Sand and cement shall be free from lumps when placed in the mixer. Grout shall be screened to remove coarse particles.

J. Nonshrink Cement-Based Grout: Grout for setting equipment, column and other bases and anchor bolts shall be nonshrink cement-based grout. Nonshrink cement-based grout shall consist of pre-measured, prepackaged materials supplied by the manufacturer, requiring only the addition of potable weater. The manufacturer's instructions shall be printed on the outside of each bag.

The manufacturer shall submit information verifying the cement-based grout exhibits the following properties:

(1) Nonshrink - No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C-827. No

shrinkage (0.0%) and a maximum of 0.2% expansion in the hardened state when tested in accordance with CRD-C 621.

(2) Compressive Strength - A minimum 28-day compressive strength of 5,000 psi when tested in accordance with ASTM C-109.

(3) Setting Time - A minimum initial set time of 60 minutes when tested in accordance with ASTM C-191.

(4) Composition - No metallic particles (aluminum powders, iron fillings) or expansive cement.

The contractor shall perform all grouting in accordance with the manufacturer's recommendations. Technical service shall be supplied upon request.

Grout shall be Five Star Grout, as manufactured by U.S. Grout Corporation, Fairfield, CT or equal.

K. Nonshrink Epoxy-Based Grout: Nonshrink Epoxy-based Grout shall be a pourable, 100% solids epoxy system consisting of three, pre-measured, prepackaged components: resin, hardener, and specially-blended aggregate. Resin component shall not contain any non-reactive diluents. Variation of component ratios is not permitted unless specifically recommended by the manufacturer.

The manufacturer shall submit information verifying the epoxy grout exhibits the following properties:

(1) Grout for bonding new cement to old, setting reinforced dowels into pre-drilled holes and or pressure grouting shall be an epoxy grout mixed in accordance with the manufacturer's instructions.

(2) Nonshrink - No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C-827.

(3) Compressive Strength - A minimum compressive strength of 10,000 psi in 7 days when tested according to ASTM C-579, Method B.

(4) Heat Development - A maximum 100 degrees F peak exotherm in a 2" diameter x 4" high sample when tested at 75 degrees F material and laboratory temperatures.

(5) Thermal Coefficient - A maximum 30 x 10^6 in./in./degree F thermal coefficient when tested according to ASTM C-531.

The contractor shall perform all grouting in accordance with the manufacturer's recommendations. Technical service shall be supplied upon request.

Grout shall be Five Star Epoxy Grout, as manufactured by U.S. Grout Corporation, Fairfield, CT or equal.

L. Drypack Mortar: Drypack mortar shall be composed of approximately one part Type II Portland cement, 1½ to 2 parts sand, 2 to 3 fluid ounces water reducing densifier per sack of cement, aluminum powder as required for shrinkage control, and sufficient water to make a stiff workable mix. Sand, cement, water, and water reducing densifier shall be as specified for concrete.

6.03 QUALITY AND CONTROL

A. Design: Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate and water. All concrete shall be designed by an approved testing laboratory in accordance with the ACI Standard Recommended Practice for Selecting Proportions for Concrete (ACI-211) to produce the strength for each class of concrete specified, and with slumps and maximum sizes of coarse aggregate in accordance with the requirements outlined below. The concrete shall be so designed that the concrete materials will not segregate and excessive bleeding will not occur. Any costs to the testing laboratory for designing concrete mixes shall be borne by the Contractor.

Prior to placing any concrete, the Contractor shall submit for review mix designs for each specified concrete and grout type. Design data shall include the name of the concrete supplier; manufacturer/supplier and type of cement used; size and type of aggregate; proportional weights of cement, aggregate, and water per cubic yard of concrete; name and quantity of admixture used. Trial batches shall be made and the following data shall be submitted: 1-seven day, 1-14 day, and 1-28 day compressive strength test for each mix at various slumps; and percent of air content for each mix. No deviation for accepted mix designs will be permitted without prior written approval by the Engineer.

Concrete strengths shall be as follows:

Class A Concrete - 4000 psi @ 28 days; minimum

		6 sack mix (To be used for all work unless otherwise specified)
Air Content	-	4 ± 1%
Maximum Water Cement Ratio	-	0.45
Class B Concrete	-	2000 psi @ 28 days; minimum 4 sack mix (To be used only as concrete fill)

MAXIMUM SLUMPS FOR VARIOUS
TYPES OF CONSTRUCTION

Types of Construction	Hand Placed Maximum	High Frequency Vibrator Used Maximum
Reinforced Foundation Walls and Footings	4"	2"
Slabs, Beams, and Reinforced Walls	4"	3"
Building Columns	4"	3"
Pavements	3"	2"

The slump shall not exceed the maximum specified above for the type of construction for which it is to be used. The 28-day compressive strength determined in accordance with current ASTM Specifications C-39 and C-31 and with specimens cured in accordance with C-31 shall not be less than that shown above for the specified class of concrete. No water will be added after the amount specified by the mix design.

B. Production of Concrete: All ready-mixed concrete shall be batched, mixed and transported in accordance with "Specifications for Ready-Mixed Concrete (ASTM C-94)". Plant equipment and facilities shall conform to the "Check List for Certification of Ready-Mixed Concrete Production Facilities" of the National Ready-Mixed Concrete Association. Site mixed concrete shall conform to the requirements of "Specifications for Structural Concrete" (ACI-301). The Contractor may elect to use either ready-mixed or site mixed concrete for this project provided he informs the Engineer of his choice.

C. Laboratory Testing: The Owner shall engage an independent testing laboratory to conduct concrete tests. Unless otherwise informed, the Contractor will be responsible for sampling concrete for test cylinders, recording, and delivering them to the laboratory, providing all materials required, and for making all slump tests in the field directed by the Engineer. All costs in connection with work performed by the laboratory will be paid by the Owner. The Contractor shall be responsible for the costs of work performed by the laboratory required for redesign of concrete proportions and re-testing of in place concrete when cylinders indicate low strength concrete has occurred.

At least one test shall be made on fresh concrete for each sixty (60) cu. yds. of each class of concrete (or fraction thereof) placed on any one day and in any event, not less than one test for each class of concrete each day it is used. Testing shall be done in accordance with the following ASTM Specifications, latest edition:

C172, Standard Method of Sampling Fresh Concrete
C31, Standard Method of Making and Curing Concrete Compression & Flexure Test Specimens in the Field
C39, Standard Method of Test of Compressive Strength of Molded Concrete Cylinders
C143, Standard Method of Slump Test for Consistency of Portland Cement Concrete

Before any concrete is poured, the Contractor shall construct a storage box in accordance with ASTM Specification C31. Each set of tests shall consist of one slump test and three compression test cylinders. All cylinders shall be kept in the storage box for the first 24 hours. The three cylinders shall be laboratory cured and tested for adequacy of the design for strength of the concrete in accordance with ASTM Specification C31. One cylinder shall be tested at 7 days and two at 28 days.

D. Failure of Concrete to Meet Strength Requirements: The concrete shall be considered acceptable if, for any one class of concrete, the average of all tests or any five consecutive tests is equal to or greater than the specified strength, provided that no more than one test of the five falls between 90% and 100% of the specified strength. The only cylinders to be used for determination of concrete acceptability will be those laboratory cured and tested at 28 days. When it appears the tests of laboratory-cured cylinders will fail to meet these requirements, the Engineer may require changes in the proportions of concrete for the remainder of the work in order to meet the strength requirements. In addition, the

Engineer may also require additional curing not to exceed a total of 21 days on portions of the concrete already poured.

The Engineer may also require tests in accordance with Methods of Securing, Preparing and Testing Specimen from Hardened Concrete for Compressive and Flexural Strengths (ASTM Specifications C42) when the concrete cylinder tests fail to meet strength requirements. In the event there still is questions as to the quality of the concrete in the structure, the Engineer may require load tests for that portion where the questionable concrete has been placed. Such load tests will be made as outlined in Chapter 20 of American Concrete Institute Building Code. (ACI 318-71), and shall be at the expense of the Contractor.

E. Removal of Under Strength Concrete: If the above tests indicate that a particular batch of previously placed concrete is under strength, the Engineer may direct that the under strength batch be removed and replaced. The removal of the under strength concrete shall also include the removal of concrete that has obtained the required strength if the Engineer deems this necessary to obtain structural or visible continuity when the concrete is replaced.

The removal, and replacement of any under strength concrete, shall be made at no additional cost to the Owner. This shall include any new formwork required or any reinforcing steel that may be required. The Owner shall not be charged any additional costs for any extra work that is required because of the failure of any concrete to meet the minimum test requirements.

6.04 INSTALLATION:

A. Preparation Before Placing: Water shall be removed from excavations before concrete is deposited. Hardened concrete, wood chips, shavings, and other debris shall be removed from interior of forms and inner surfaces of mixing and conveying equipment. Wood forms shall be oiled or, except in freezing weather, wetted with water in advance of pouring. Reinforcement shall be secured in position, inspected and approved by the Engineer before starting pouring of concrete.

B. Conveying: Concrete shall be conveyed from mixer to forms as rapidly as practicable and by methods which will prevent segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position. Chutes used shall be such that concrete slides in them and does not flow. Chutes, if permitted, shall have a slope of less than 1 on 2. Where a vertical drop

greater than five (5) feet is necessary, placement shall be through elephant trunks or similar devices to prevent segregation.

C. Placing: Concrete shall be placed before initial set has occurred and in no event after it has contained its water content for more than 30 minutes. Unless otherwise specified, all concrete shall be placed upon clean, damp surfaces free from running water, or upon properly consolidated fills, but never upon soft mud or dry, porous earth. The concrete shall be compacted and worked in an approved manner into all corners and angles of the forms and around reinforcement and embedded fixtures as to prevent segregation of the coarse aggregate. Construction of forms for the lifts of vertical walls shall be such as to make all parts of the walls easily accessible for the placement, spading, and consolidation of the concrete as specified herein.

D. Vibration: All concrete shall be placed with the aid of mechanical vibration equipment as approved by the Engineer. Vibration shall be transmitted directly to the concrete; in no case shall it be transmitted through forms. The duration of vibration at any location in the forms shall be held to the minimum necessary to produce thorough compaction. Vibrations shall be supplemented by forking or spading by hand, and adjacent to the forms on exposed faces in order to secure smooth, dense and even surfaces, with particular care being taken to prevent coarse aggregate from becoming set too near any surfaces that are to receive rubbed finish.

E. Construction Joints: Construction joints shall be formed as indicated on the Drawings or as approved or directed by the Engineer. Where indicated or required, dowel rods shall be used. All concrete at the joints shall have been in place not less than 12 hours, and longer if so directed by the Engineer, before concrete resting thereon is placed. Before placing is resumed, or commenced, excess water and laitance shall be removed, and concrete shall be cut away, where necessary, to insure a strong dense concrete at the joint. In order to secure adequate bond, the surface of concrete already in place shall be cleaned, roughened, and then spread with a one-half (½) inch layer of mortar of the same cement-sand ratio as is used in the concrete, immediately before the new concrete is deposited. The unit of operation is not to exceed 100 feet in any horizontal direction, unless otherwise required by the Drawings. Construction joints, if required, shall be located near the mid-point spans for slabs, beams or griders. Joints in columns or piers shall be made at the underside of the deepest beam or girder at least five (5) hours before any overhead work is placed thereon. Joints not shown or specified shall be so

located as to least impair strength and appearance of work. Vertical joints in wall footings shall be reduced to a minimum. Placement of concrete shall be at such a rate that surfaces of concrete not carried to joint levels will not have attained initial set before additional concrete is placed thereon. Girders, beams and slabs shall be placed in one operation. To insure a level straight joint in exposed vertical surfaces, a strip of dressed lumber may be tacked to the inside of the forms at the construction joint. The concrete shall be poured to a point one (1) inch above the underside of the strip. The strip shall be removed one (1) hour after concrete has been placed and any irregularities in the joint line leveled off with a wood float and all laitance removed. Waterstops shall be installed in all construction joints below grade or in liquid containing structures as noted on the Plans.

F. Patching: Any concrete which is not formed as shown on the Plans, or for any reason is out of alignment or level or shows a defective surface shall be considered as not conforming with the intent of these Specifications and shall be removed from job by Contractor at his expense, unless the Engineer grants permission to patch defective area, which shall be done in accordance with the following procedure. Permission to patch any such area shall not be considered a waiver of the Engineer's right to require complete removal of defective work if patching does not, in his opinion, satisfactorily restore quality and appearance of surface. Suitable non-shrink, latex or epoxy mortar shall be used for patching and repairing defective surface if directed by the Engineer.

After removing forms, all concrete surfaces shall be inspected and any poor joints, voids, stone pockets, all tie holes, or other defective areas shall be patched, if permitted by the Engineer. Where necessary, defective areas shall be chipped away to a depth of not less than one (1) inch with edges perpendicular to the surface. Area to be patched and a space at least six (6) inches wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar. A grout of equal parts Portland cement and sand, with sufficient water to produce a brushing consistency, shall then be well brushed into the surface followed immediately by the patching mortar. The patch shall be made of the same material and of approximately the same proportions and shall not be richer than 1 part cement to 3 parts sand. White Portland cement shall be substituted for a part of the gray Portland cement to match color of the surrounding concrete. The proportion of white and gray cements shall be determined by making a trail patch. The amount of mixing water shall be as little as consistent with the requirements of handling and placing. The mortar shall be re-tempered without

the addition of water by allowing it to stand for a period of one (1) hour during which time it shall be mixed occasionally with a trowel to prevent setting.

The mortar shall be thoroughly compacted into place and screeded off so as to leave patch slightly higher than surrounding surface. It shall then be left undisturbed for a period of 1 to 2 hours to permit initial shrinkage before being finally finished. the patch shall be finished in such a manner as to match the adjoining surface. On exposed surfaces where unlined forms have been used, the final finish shall be obtained by striking off the surface with a straightedge spanning the patch and held parallel to the direction of the form marks.

Tie holes left by withdrawal of rods or the holes left by removal of ends of ties shall be filled solid with mortar after first being thoroughly wetted.

G. Slabs on Grade: The Contractor shall insure that subgrade has been thoroughly compacted and leveled prior to concrete placement. Sprinkle all subgrades with water no more than ½ hour prior to placing concrete.

Place vapor barrier below interior slabs unless noted otherwise. Sprinkling of fill is not necessary when using vapor barrier. Lap vapor barrier 6" in direction of pour, and seal laps with specified mastic. Repair all ruptures of the vapor barrier that might occur before or during concrete pour.

The Contractor shall insure that all reinforcing steel is located properly prior to pour, and that steel will not be vertically displaced during the pour.

H. Edging: Edges exposed to view on the outside of structures, footings, pads and slabs, and all those in the inside of structures shall be chamfered, beveled or neatly edged with a radius tool as approved by the Engineer. Bevel shall be at an angle of 45 degrees, such bevel being ¾ inch on a side. If so required by the Engineer, however, the Contractor shall provide square edges for any portion of the work.

6.05 SLAB FINISHES:

A. Exterior Walks & Paving: The top surface shall be "slip-resistant" as follows:

Steel troweled as noted in SECTION 6.05B and have a final finish applied in brushing lightly with a soft bristle brush to form a slightly roughed surface.

B. Interior slabs that are to receive a finish floor covering (this does not include ceramic tile covering) shall be finished by tamping the concrete with special tools to force the coarse aggregate below the surface, then screeding and floating with straightedges to bring the surface to the required finish level. While the concrete is still green but sufficiently hardened to bear a man's weight without deep imprint, it shall be wood floated to a true and even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood floats to bring moisture to the surface. After surface moisture has disappeared, surfaces shall be steel-trowelled to a smooth, even, impervious finish, free from trowel marks. After cement has set enough to ring the trowel, surface of all slabs shall be given a second steel trowelling to a burnished finish.

C. Interior slabs to receive fill or mortar setting bed shall be finished by tamping concrete with special tools to force coarse aggregate below the surface, and screeded with straightedges to bring surface to required finish plane. Surface shall be left roughened sufficiently to produce good bond with topping material.

D. Top and bottom slabs of all structures and water carrying conduits except as noted otherwise on the Plans shall be finished as follows: The top of the slab shall be screeded to grade and cross section; lightly tamped as required to bring up a good bed of mortar for finishing and re-screeded as necessary. The surface shall then be finished with a wood float and leveling darby. No further finish will be required on top slabs of structures or conduits which are to be buried. In the case of all exposed top slabs of structures and conduits, they shall be given a final wood float and a light broomed, slip resistant finish to a uniform surface which conforms with accuracy to required shape, slope and grade. Slabs shall be edged as appropriate.

E. Interior floor slabs that are not to receive any finish floor covering shall be "slip resistant finish" as follows: The top surface shall be steel trowelled as noted in 6.05B above and have a final finish applied by brushing lightly with a soft bristle brush to form a slightly roughed surface.

F. The floor surfaces of basins in which raking mechanisms are to be installed shall be finished, as indicated on the Drawings, by sweeping in cement grout with the mechanism. The cement grout

to be used shall be composed of one part Portland cement and two parts sand by weight.

The sweeping-in process shall be performed under the supervision of the Engineer or, if necessary, under the supervision of a factory representative of the equipment manufacturer.

The slab upon which the grout is to be applied shall be finished in accordance with the provisions of paragraph C3.5D above except that after leveling and floating, it shall be raked in such a manner as to provide a good bond for the grout. Before grout is deposited on the slab, it shall be thoroughly cleaned, wet down with clean water, and lightly dusted with neat cement immediately prior to placement of the grout.

G. Concrete Hardener shall be applied to the floors where scheduled to be exposed concrete. Concrete surfaces to be treated must be thoroughly set and dry, clean and free of dust. Three applications of "lapidolith", "saniseal", "hornolith","vitrox", or approved equal liquid are required, using one gallon per 100 square feet for the complete treatment. Apply hardener strictly according to the manufacturer's printed instructions. Any substitution for the specified hardeners must be of the magnesium fluosilicate or zinc fluosilicate types.

6.06 FINISH OTHER THAN FLOORS:

A. All top surfaces, other than slabs, not covered by forms, and which are not to be covered by additional concrete or fill shall receive a wood float finish without additional mortar. Care shall be taken that no excess water is present when the finish is made. Other surfaces shall be brought to finished elevations and left true and regular. All exposed interior concrete shall be grouted smooth and give a cement wash of one part light colored Portland cement and two parts fine aggregate mixed with water to consistency of thick paint. Grout shall be cork or wood floated to fill all pits, air bubbles, and surface holes. Excess grout shall be scraped off with a trowel and rubbed with burlap to remove any visible grout film. Surface shall be kept damp during setting period. The finish for any area shall be completed in same day and the limits of a finished area shall be made at natural breaks in finished surface.

B. Rubbed Finish Unless otherwise indicated, all faces (except top surfaces of slabs) exposed to view, such as walls, grade beams, columns, beams, canopy soffits and fascias, etc. shall be finished as follows:

Forms shall be removed, as specified in SECTION 4 - CONCRETE FORMWORK, and all fins removed, offsets leveled, damaged places and depressions resulting from the removal of metal ties or other causes shall be carefully pointed with a mortar of sand and cement in the proportion which has been employed for the particular class of concrete treated. The surface film of all such pointed places shall be carefully removed before setting occurs. After the point has set sufficiently to permit it, all exposed surfaces shall be dampened and rubbed with a No. 16 carborundum stone, to a smooth even plane. Final rubbing shall be done with a No. 30 carborundum stone, or an abrasive of equal quality, to obtain an entire surface of a smooth texture and uniformity in color. Mortar or grout worked up during rubbing shall be promptly removed by sacking with burlap or other suitable means so that no visible grout film or paste will remain. A cement wash or plaster coat shall not be used. All surfaces shall be finished uniformly smooth and washed clean. The rubbed finish for any area shall be completed in the same day and the limits of a finished area shall be made at natural breaks in the finished surface. If the Contractor does not provide suitable surface finish using carborundum stones specified above, the Engineer, without additional cost to the Owner, may require the use of a power operated grinding machine to produce the desired finish.

6.07 CURING:

A. Unformed concrete surfaces shall be water cured to prevent check of the fresh concrete surface. Where drying conditions are severe, as determined by the Engineer, fog sprays shall be employed to prevent checking of the fresh concrete surface. Fog spraying shall be continued as specified until the finished surface has attained sufficient strength to permit flooding or covering with burlap mats. Where drying conditions are not severe, as determined by the Engineer, unformed concrete surfaces shall be covered with wet burlap mats as soon as the concrete has sufficiently set, and shall thereafter be kept under wet burlap.

Formed surfaces, both interior and exterior, shall be water cured by water sprays or under burlap mats beginning as soon as the forms are stripped. Prior to stripping of forms, the concrete and forms shall be kept moist by the water sprays.

Unless otherwise specified, surfaces shall be water cured for 7 days after the concrete is placed.

After 48 hours of water cure, and with the acceptance of the Engineer, the curing of concrete surfaces may be completed by the curing compound method. Curing compounds shall be applied in strict conformance with the manufacturer's instructions. If the compound is applied to a surface which is later to be painted, the Contractor shall thoroughly sandblast the surface to remove all vestiges of the compound prior to concrete finishing. Curing compound shall not be used on any surfaces against which additional concrete or other finishing materials are to be bonded.

B. In all concrete structures, Class A concrete made with normal Portland cement shall be prevented from drying for at least the first seven (7) days after placing. Whenever the temperature of the surrounding air is between 40 deg. and 60 deg. F., adequate provision shall be made for maintaining the temperature of concrete above 60 deg. F. or the moist curing period shall be extended to insure a compressive strength corresponding to that which would be secured under provisions of the previous part of this paragraph.

C. Whenever the temperature of surrounding air is below 40 deg. F., all Class A concrete shall be maintained at a temperature of not less than 50 deg. F. for at least 72 hours for normal concrete or for as much more time as is necessary to insure proper rate of curing of the concrete. The housing, covering or other protection used in connection with curing shall remain in place and intact at least 24 hours after the artificial heating is discontinued. No salt or other chlorides shall be used for prevention of freezing.

D. Protection from the Sun: All concrete shall be adequately protected from injurious action of sun in a manner satisfactory to the Engineer.

E. Temperature Control: During and at the conclusion of the specified curing period, means shall be provided to insure that the temperature of the air immediately adjacent to the concrete does not fall more than 3 deg. F in any 1 hour nor more than 30 deg. F in any 24 hours.

6.08 CONCRETING IN COLD WEATHER: When the atmospheric temperature may be expected to drop below 40 deg. F at the time concrete is delivered to the work site, during placement, or at any time during the curing period, the following provisions also shall apply:

A. The temperature of the concrete at the time of placing shall not be less than 50 deg. F nor more than 90 deg. F. The temperature of

neither aggregates nor mixing water shall be more than 100 deg. F just prior to mixing with the cement.

B. When the daily minimum temperature is less than 40 deg. F, concrete structures shall be insulated or housed and heated after placement. The temperature of the concrete and air adjacent to the concrete shall be maintained at not less than 50 deg. F nor more than 90 deg. F for the duration of the curing period.

C. Methods of insulating, housing, and heating the structure shall conform to "Recommended Practice for Cold Weather Concreting," ACI Standard 306.

D. When dry heat is used to protect concrete, means of maintaining an ambient humidity of at least 40% shall be provided unless the concrete has been coated with curing compound or is covered tightly with an approved impervious material.

6.09 CONCRETING IN HOT WEATHER: When climatic or other conditions are such that the temperature of the concrete may reasonably be expected to exceed 90 deg. F at the time of delivery at the work site, during placement, or during the first 24 hours after placement, the following provisions also shall apply:

A. The Contractor shall maintain the temperature of the concrete below 90 deg. F during mixing, conveying, and placing. Methods used shall conform to "Recommended Practice for Hot Weather Concreting," ACI Standard 305.

B. The concrete shall be placed in the work immediately after mixing. Truck mixing shall be delayed until only time enough remains to accomplish it before the concrete is placed.

C. Exposed concrete surfaces which tend to dry or set too rapidly shall be continuously moistened by means of fog sprays or otherwise protected from drying during the time between placement and finishing, and after finishing.

D. Finishing of slabs and other exposed surfaces shall be started as soon as the condition of the concrete allows and shall be completed without delay.

E. Concrete surfaces exposed to the air shall be covered as soon as the concrete has hardened sufficiently and shall be kept continuously wet for at least the first 48 hours of the curing period,

and for the entire curing period unless curing compound is applied as specified.

F. Formed surfaces shall be kept completely and continuously wet for the duration of curing period (prior to, during, and after form removal) or until curing compound is applied as specified.

6.10 INSERTS AND EMBEDDING:

A. Inserts: Where pipes, castings or conduits are to pass through the walls, the Contractor shall place such pipes or castings in the forms before pouring the concrete, or in special cases, with the express consent of the Engineer or as specified, he shall build accepted boxes in the forms to make openings for subsequent insertion of such pipes, castings or conduits as required by the Engineer. To withstand water pressure and to insure watertightness around the openings so formed, the boxes shall be provided with continuous keyways and waterstops all the way around, and they shall have a slight flare to facilitate grouting and the escape of entrained air during grouting. Before placing the grout, the concrete surfaces and the surfaces of the insert shall be coated with an epoxy bonding compound. Mixing and application of the bonding agent and time of placement of the grout shall be in accordance with the manufacturer's directions.

Additional reinforcement shall be provided around large openings, as shown on the drawings. The pipes, castings or conduits as specified shall be grouted in place by pouring in grout under a head of at least 4 inches. The grout shall be poured or rammed or joggled into place to fill completely the space between pipes, castings or conduits, and the sides of the openings so as to obtain the same watertightness as the wall itself. The grouted castings shall then be water cured as specified herein. The grouting material so placed shall be surfaced when the forms are removed to give a uniform appearance to the wall if such wall be exposed to view.

B. Embedding: The Contractor shall set accurately and hold in exact position in the forms until the concrete is poured and set, all gate frames, gate thimbles, special castings, channels or other metal parts that are to be embedded in the concrete; and he shall set accurately all inserts and anchor or other bolts necessary for the attaching of piping, valves, metal sash and equipment. All nailing blocks, plugs, strips and the like, necessary for the attachment of trim, finish and similar work shall be furnished and placed by the Contractor.

Blockouts may be used for embedded items, with the prior written consent of the Engineer. Where blockouts are allowed, non-shrink cement based grout shall be used to set the embedded items.

In lieu of embedding anchor bolts and other items to be anchored in the concrete, the Contractor will be permitted with prior written acceptance of the Engineer, to drill holes in hardened concrete and install the anchor bolts and other items with non-shrink epoxy based grout. Drilling or coring holes shall be done by rotary drill with diamond boring or coring bits. Bonding mortar or grout shall be epoxy bonding adhesive grout or epoxy bonding adhesive mortar. Holes shall be blown clean and dry before installation of embedded items. Before insertion, both the hole and the item to be embedded shall be coated with bonding compound. Studs of equal size and length may be substituted for anchor bolts if nut fasteners are used. When accepted by the Engineer, three-part compounded expansion shields may be used for anchorage of minor miscellaneous metal.

6.11 DRYPACK MORTAR: Where surfaces are required to be built up with mortar, such surfaces shall be thoroughly roughened by brushing, completely cleaned, and coated with appropriate bonding compound before the application of the required mortar. The mortar shall be applied immediately following the application of the bonding compound in bands or strips to form a compact durable covering of the required thickness and shall be free from lumps and depression. Construction joints in the mortar shall be sloped to thin edges and, before application is resumed, the joint shall be thoroughly cleaned. Drypack mortar shall be used for built-up surfaces, setting miscellaneous metal items, and correcting minor repairs and imperfections.

No mortar shall be applied during freezing weather unless adequate protection is provided.

The mortar shall be cured as specified for concrete.

6.12 MODIFICATION OF EXISTING CONCRETE: Where the work indicated on the drawings required modification of existing concrete structures or concrete poured over six months previously to be removed or modified, the existing concrete shall be cut accurately to the lines required under the supervision of the Engineer. Concrete faces exposed to view shall be cut with a concrete saw. The cutting shall be accomplished in a manner that preserves, free from cracks or other injuries, those parts of the existing structure that are to remain. Where the cut surface is to be left exposed, it shall be cleaned and faced with non-shrink grout and finished to match

adjacent surface. Where new concrete or mortar is to be placed against existing concrete surfaces or surfaces that have been cut, such surfaces shall be thoroughly cleaned by sandblasting, if required by the Engineer, and coated with the bonding compound just prior to the placement of the new concrete. Bonding compounds shall be as specified herein. Depth of saw cut should be ¾" minimum. Unless otherwise indicated on the drawings or specified, continuity of reinforcing steel shall be obtained by either exposing bars to provide sufficient laps with new bars or by welding existing bars with new bars as specified. Where indicated, existing bars shall be exposed and fully developed by; embedding in new concrete.

6.13 PROTECTION AND REPAIR OF CONCRETE CONSTRUCTION: All surfaces shall be protected against injury. During the first 72 hours after placing the concrete, any wheeling, working or walking on the concrete shall not be permitted. All slabs subject to wear shall be covered with a layer of sand or other suitable material as soon as the concrete has set. Sisalcraft paper or other similar tough waterproof paper may also be used, provided all joints between adjacent strips of paper are carefully sealed. This does not alter the requirements for proper curing as specified herein.

No concrete slabs or top surfaces or walls shall be placed during rain unless acceptable protective shelter is provided, and during such weather, all concrete placed within the preceding 12 hours shall be protected with waterproof canvas or other suitable coverings. These shall be provided and kept ready at hand.

Immediately after the removal of forms, all concrete shall be inspected, and all pour joints, rough sections or rock pockets containing loose materials such size and shape as will form a 1" key for cement mortar fill. Before the mortar is applied, the surface of the existing concrete shall be coated with epoxy bonding compound. All form tie holes and small imperfections shall be filled. The fill for small imperfections and form ties shall consist of cement mortar composed of one part cement well mixed with three parts of the fine aggregate by volume and just enough water so that the mortar will stick together on being molded into a ball by slight pressure of the hands; and is shall be thoroughly compacted into place. Where the area or volume of defective concrete is large, it may be repaired by; reforming the surface and filling the opening with concrete. For such major repairs, the filling shall be reinforced and doweled securely to the old concrete, neatly finished to match the surface and texture of the adjacent concrete. All patches shall be cured as accepted by the Engineer.

6.14 PAYMENT: No separate payment shall be made for any item listed in this section, but shall be considered subsidiary to the price for other items.

SECTION 10

PREFABRICATED CAUSTIC SODA FACILITIES

10.01 GENERAL: Vendor will furnish a chemical feed system to raise the alkalinity in the wastewater influent at the Magnolia Wastewater Pant. The equipment will consist of a prefabricated FRP building, a peristaltic pump, an ultrasonic flowmeter and a local control panel for the pump. Chemical Feed System shall be supplied by Instrument and Supply, Inc. of Hot Springs, or approved equal.

The system installation shall be completed, including providing and installing an adequate size concrete slab reinforced per the plans, steel, all necessary electrical power connections, necessary water lines with connections, necessary sitework including grading and shaping, and all other work necessary for a complete and operating caustic soda feed system.

10.02 FIBERGLASS BUILDING: The caustic soda building will be completely assembled (including all internal wiring), ready to install, compact type capable of housing a complete caustic soda system. The building shall be supplied with all components including piping, factory mounted by the caustic soda system manufacturer.

The building shall be approximately 8' deep by 8' wide by 84" high. The building shall contain necessary electrical, and equipment. The building shall be constructed of durable xylem (wood) framing and covered with sprayed-on polyester resin and fiberglass of 30 percent glass fibers. Aluminum trihydrate filler is added for flame retardance. Polyurethane foam insulation is sprayed into the interior cavities for insulation and then covered with 5/32 inch paneling coated with fiberglass. The interior and exterior are then coated with white orthophalic gelcoat for maintenance free protection.

A 12" x 12" plexiglass window shall be provided in the door for inspection of the interior without opening the door. The door shall be hinged and key lockable 5'-0"x6'-8".

The building shall also include, as shown on the plans, but not limited to the following:

A. Light with protective cover (2 EA.).

B. Switch for light and supply fan located on exterior of building.

C. Supply fan with thermostatic control. Supply fan shall automatically come on should temperature exceed thermostatic setting. The supply fan shall also be turned on by means of limit switch when the access door is opened.

D. 2-Heaters, 1500 watt, thermostatically controlled. (Dayton 3VU32 or approved equal)

E. Duplex receptacle (2 EA.).

F. Gravity operated exhaust louver, mounted 12" from the floor.

G. 100 amp load center.

H. Door hardware shall be stainless steel.

The building shall be sealed and anchored to the slab with stainless steel angles bolted to the slab and inside building walls. The building shall be completely pre-wired with electrical wiring in conduit and per NEC Code. A 100 amp load center shall be provided with breakers for all devices, such as receptacles, heaters, lights and ventilation.

10.03 ALKALINITY ANALYIZER: The alkalinity analyzer system shall be ChemScan as manufactured by ASA Analyitics,Waukesha, WI and contain the following:

- Single Sample Stream
- 0-200 mg/l total alkalinity as CaCO3, Potentiometric Method, programmable sample interval (minimum of 5 min.)
- One analog 4-20 mA output per sampe stream, maximum load 1000 Ohms, result value holds until next update. Dual-isolated RS-232C digital output for printer and computer interface at user-selected baud rates. 3 standard, 8 programmable relays.
- Kynar sample valve and air vent valve, Non Hazardous area classification, Nema 4X fiberglass wall mount enclosure (24"x25"x13") Power 90-240 VAC, 50-60Hz, Single phase power.
- 1 ea. Post wash pump with option for bleach or acid rinse.
- 2 sample conditioning chambers to remove debris w/ cleaning stand.
- 1 non-clog Vortex submersible (1/2 Hp) sample pump and s/s cable.
- Integrated filtration system.
- 1 year supply of titrant (0.01N HCl)

- 1 set recommended spare mainteneance kit.
- O&M manual and submittal drawings.
- Employee training by ASA Analytics authorized representatives.

COUSTIC SODA PUMP: The pump shall be of peristaltic design and will be Verderflex Vantage 5000 or equal. The pump will accept a 4-20 ma signal for adjustable flow control. The pump will have a roller type head for the tubing compression and occlusion. Compression shoe design will not be allowed. Pump will be sized to deliver 107 gpd proportional to 2.5 MGD flow through the wastewater plant. The pump will be mounted on a shelf near the building floor. Pump will have suction lift capacity of 31 feet of water but will be pumping a 5% solution of caustic soda (sodium hydroxide). Pump can run dry without damage. The pump will have usb backup. If factory settings need to be changed, a thumb drive with the changes can be sent with the changes.The pump will have tube leaf dection and an intuitive touchscreen display. Pump will be furnished with 15 feet of tubing.

Ultrasonic Flowmeter

The ultrasonic flowmeter will be model 3010 by ISCO or approved equal.
The meter will work in conjunction with an existing Parshall flume.
The lockable enclosure shall be NEMA 4x with built-in heaters. The enclosure has a viewing window.
The sensor shall be NEMA 4x and IP 68 rated for submergence. Sensor will be temperature compensated.

10.04 PIPING AND ACCESSORIES: All piping shall be schedule 80 PVC with solvent weld and schedule 80 fittings. Piping shall be prefabricated attached to walls of caustic soda building with non-corrosive clamps. Accessories shall include, but not limited to, all necessary fittings, strainer, check valve and ball valves.

A. Submittals: These specifications described a factory built caustic soda facility as manufactured by Instrument and Supply, Inc., Hot Springs, Arkansas. A factory built caustic soda facility of other manufacturers of equal design, equipment and materials may be offered. To receive consideration of any alternate, full descriptive material including, but not limited to, detailed construction drawings, an illustrated parts breakdown showing system components, parts relationship and nomenclature. All equipment not meeting the specifications shall include a written list of deviations and a sound engineering explanation justifying its acceptance as an equal.

10.05 PAYMENT: Separate payment will not be made for any item listed in this section. The cost of items in this section shall be considered subsidiary to other items.

SECTION 16

ELECTRICAL BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE

A. Supplementary Conditions

1. The General Conditions and Requirements, Special Provisions are hereby made a part of this section.

2. The Electrical Drawings and Specifications under this division shall be made a part of the contract documents. The drawings and specifications of other divisions of this contract, as well as supplements issued thereto, information to bidders, and other pertinent documents issued by the Owner's Representatives are a part of these drawings and specifications and shall be complied with in every respect. All the above documents will be on file at the office of the Owner's Representative and shall be examined by all bidders. Failure to examine all documents shall not relieve the bidder of any responsibility nor shall it be used as a basis for additional compensation due to omission of details of other divisions from the electrical documents.

3. Furnish all work, labor, tools, superintendence, material, equipment, and operations necessary to provide for a complete and workable electrical system as defined by the contract documents.

4. Contractor shall be responsible for visiting the site and checking the existing conditions. He shall also ascertain the conditions to be met for installing the work and adjust bid accordingly.

5. It is the intent of the contract documents that upon completion of the electrical work, the entire system shall be in a finished workable condition.

6. All work that may be called for in the specifications but not shown on the drawings, or, all work that may be shown on the drawings but not called for in the specifications, shall be performed by the Contractor as if described in both. Should work be required which is not set forth in either document, but which work is nevertheless required for the fulfilling of the intent thereof; then, the Contractor shall perform all such work as fully as if it were specifically set forth in the contract documents.

7. The use of the word "furnish" or "install" or "provide" shall be taken to mean that the item or facility is to be both furnished and installed under this section unless specifically stated to the contrary; that the

item or facility is to be furnished under another section and installed under this section; furnished under this section and installed under another section; or furnished and installed under another section.

8. The use of the term "as (or where) indicated"; "as (or where) shown"; "as (or where) specified"; or "as (or where) scheduled" shall be taken to mean that the reference is made to the contract documents, either under the drawings or the specifications, or both documents.

B. Standards

1. All materials and equipment shall conform to the requirements of the contract documents. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

   a. Underwriters Laboratories, Inc. (UL)

   b. National Electrical Manufacturer's Association (NEMA)

   c. American National Standards Institute (ANSI)

   d. Insulated Power Cable Engineers Association (IPCEA)

2. The definition of terms used throughout the contract documents shall be as specified by the following agencies:

   a. Underwriters Laboratories

   b. National Electrical Manufacturer's Association

   c. American National Standards Institute

   d. Insulated Power Cable Engineers Association

   e. National Electrical code

   f. National Fire Protection Association

3. Submit copies of applicable standards with each submittal

4. All material and equipment, of the same class, shall be supplied by the same manufacturer unless specified to the contrary.

5. All materials shall bear UL labels where standards have been set for listing

C. Permits, Codes, and Utilities

1. Secure all permits, licenses, and inspections as required by all authorities having jurisdiction. Give all notices and comply with all laws, ordinances, rules, regulations, and contract requirements bearing on the work.

2. The minimum requirements of the Electrical system installation shall conform to the latest edition of the National Fire Protection Association as well as local and state codes.

3. Codes and ordinances having jurisdiction over the work shall serve as minimum requirements, but, if the contract documents indicate requirements which are in excess of those minimum requirements, then the requirements of the contract documents shall be followed. Should there be any conflicts between the contract documents and codes, or any ordinances having jurisdiction, report these with the bid.

4. Determine the exact requirements for the utility services as set by the utilities that will serve the facility, and pay for and perform all work as required by those utilities for temporary electrical construction power. Provisions for permanent electrical power to the site shall be the responsibility of the owner.

5. The Contractor shall notify the power company and power provider immediately upon award of the contract.

6. All electrical work shall be performed by journeymen electricians and apprentice electricians under the direct supervision of a master electrician, all of which shall be licensed by the authority having jurisdiction.

1.02 SHOP DRAWINGS AND SUBMITTALS

A. Shop Drawings

1. Shop drawings shall be taken to mean detailed drawings with dimensions, schedules, weights, capacities, installation details, and pertinent information that will be needed to describe the Material or equipment in detail.

2. Submittals shall be taken to mean catalog cuts, general descriptive information, catalog numbers, and manufacturer's name.

3. Submit six copies for review of all shop drawings and submittals as hereinafter called for within sixty days after award of contract. If shop drawings and submittals are not received in sixty days, the Owner's representative reserves the right to go directly to the manufacturer for the information and any expense incurred shall be borne by the Contractor.

4. Review of submittals or shop drawings shall not remove the responsibility for furnishing materials or equipment of proper dimensions, quantity and quality, nor will such review remove the responsibility for error in the shop drawings or submittals.

5. Shop drawings and submittals will be returned and unchecked if the specific items proposed are not clearly marked, or if the general contractor's approval stamp is omitted.

6. When requested, furnish samples of materials for acceptance review. If a sample has been reviewed and accepted, that item of material or equipment when installed on the job shall be equivalent in quality to the sample. If it is found that the installed item is not equivalent, then all such items shall be replaced with an item that is deemed to be equivalent to the accepted sample.

7. Submit catalog literature for each item of material specified.

B. Operations and Maintenance Manuals

1. Six weeks prior to the completion of the project, compile an operations and maintenance manual on each item of equipment. These manuals shall include detailed instructions on operations and maintenance as well as spare parts list.

2. Submit six copies for review.

C. Record Drawings

1. As the job progresses, mark up with red pencil on blueline prints the deviations from the Contract Documents of all raceway, wiring, and equipment installations.

2. After completion of job, transcribe this information onto sepia prints and label "Record Drawings."

3. Details of control instrumentation and signal wiring that are not shown in the Contract Drawings shall be included with the Record Drawings.

4. Raceway and wiring details of each pullbox and junction box larger than 100 cubic inches shall be included with the Record Drawings. These details shall show size of each conduit penetration, wire size, wiring function and terminus information of each raceway and wire.

1.03 QUALITY CONTROL

A. Acceptance and substitution:

1. All manufacturers named are a basis as standard of quality and substitutions of any equivalent product will be considered for

acceptance. The judgment of equivalence of product substitution shall be made by the Engineer.

2. Substitutions after award of contract shall be made only within sixty days after the award of contract. Furnish all required supporting data. The submittal of substitutions for review shall not be cause for time extensions.

3. Where substitutions are offered, the substituted product shall meet the product performance as set forth in the specified manufacturer's current catalog literature, as well as meeting the details of the contract documents.

4. The details on the drawings and the requirements of the specifications are based on the first listed item of materials or equipment. If any other than the first listed materials or equipment is furnished, then the contractor shall assume responsibility for the correct function, operation, and accommodation of the substituted item. In the event of misfits or changes (due to the contractor's substitution) in the work required, either in this Section or other Sections of the contract, or in both; the Contractor shall bear all costs in connection with all changes arising out of the use of other than the first listed item specified.

5. Energy efficiency of each item of power consuming equipment shall be considered one of the standards for evaluation.

B. Excavation and Backfilling

1. Do all excavating and backfilling necessary for the installation of the work. This shall include shoring and pumping in ditches to keep them dry until the work in question has been installed. All shoring required to protect the excavation and safeguard employees shall be properly performed. See Contract Specification Section TRENCH SAFETY as applicable.

2. All excavations shall be made to the proper depth, with allowances made for floor slabs, forms, beams, finished grades, etc. Ground under conduits shall be well compacted before conduits are installed.

3. All backfill shall be made with selected soil, free of rocks and debris and shall be pneumatically tamped in six inch layers to secure a field density ration of 90%, unless otherwise specified.

4. All excavated material not suitable and not used in the backfill shall be removed to the on-site disposal area. Area shall be as directed by the Engineer.

5. Field check and verify the locations of all underground utilities prior to any excavating. Avoid disturbing these as far as possible. In the

event existing utilities are broken into or damaged, they shall be repaired so as to make their operation equivalent to that before the trenching was started.

6. Where the excavation requires the opening of existing walks, drives, or other existing pavement, these facilities shall be cut as required to install new lines and to make connections to existing lines. The sizes of the cut shall be held to a minimum, consistent with the work to be installed. After installation of new work is completed and the excavation has been backfilled in accordance with above, repair existing walks, drives, or other existing pavement to match existing installation.

C. Cutting and Patching

1. Cutting and patching required under this section shall be done in a neat workmanlike manner. Cutting lines shall be uniform and smooth.

2. Use concrete saws for large cuts in concrete and use core drills for small round cuts in concrete.

3. Where openings are cut through masonry walls, provide lintel or other structural supports to protect the remaining masonry. Adequate support shall be provided during the cutting operation to prevent damage to the masonry.

4. Where large openings are cut through metal surfaces, attach metal angles around the opening.

5. Patch concrete openings that are to be filled with nonmetallic, non-shrinking grout. Finished concrete patching shall be troweled smooth and shall be uniform with surrounding surfaces.

6. No cutting of structural elements shall be done without permission of the Engineer.

D. Flashing

1. Provide waterproof flashing for each penetration of exterior walls and roofs.

2. Flashing for conduit penetrations through built-up roofs shall be made with pitch panel filled full with pitch.

E. Construction Requirements

1. Except where specifically detailed or shown, the locations and elevations of equipment are approximate and are subject to small revisions as may prove necessary, or desirable, at the time the work is installed. Final locations shall be confirmed with the Engineer in

advance of construction. Confirmed locations shall be made for the following:

a. Poles
b. Receptacles
c. Rough ins and connections for equipment furnished under other sections
d. Lighting Fixtures
e. Outlets
f. Motor Controllers, Switchboards, Panelboards, etc.

2. Where equipment is being furnished under another section, request from the Engineer an accepted drawing that will show exact dimensions of required locations of connections. Install the required facilities to the exact requirements of the approved drawings.

3. All work shall be done in the best and most workmanlike manner by qualified, careful electricians who are skilled in their trade. The standards of work required throughout shall be of the first class only and electricians whose work is unsatisfactory to the Engineer shall be instantly dismissed from the work upon written notice from the Engineer. All work must meet the approval of the Engineer.

4. Unless shown in detail, the drawings are diagrammatic and do not give exact details as to elevations and routing of conduits, nor do they show all offsets and fittings; nevertheless, install the conduit system to conform to the structural and mechanical conditions of the construction. Unless locations and routing of exposed conduits are shown, confirm locations and routing prior to installation with the Engineer.

5. Holes for raceway penetration into sheet metal cabinets and boxes shall be accurately made using a hole punch. Cutting openings with a torch or other device that produces a jagged, rough cut will not be acceptable.

6. Raceway entry into equipment shall be carefully planned. Cutting of enclosure framework to accommodate poorly planned raceway placement will not be acceptable.

7. Cabling inside equipment shall be carefully routed, trained, and laced. Cables so placed that they obstruct equipment devices shall not be acceptable.

8. Equipment shall be set level and plumb. Supporting devices installed shall be set and so braced that equipment is held in a rigid, tight fitting manner.

F. Equipment Protection

1. Provide suitable protection for all equipment, work, and property against damage during construction.

2. Assume full responsibility for material and equipment stored at the site and incorporated within the project.

3. Conduit openings shall be closed with caps or plugs during installation. All outlet boxes and cabinets shall be kept free of concrete, plaster, dirt, and debris.

4. Equipment shall be covered and tightly sealed against entrance of dust, dirt, and moisture.

5. All dry transformers prior to being energized shall be protected against moisture and dirt absorption by a suitable covering. Also, maintain heat inside the covering by means of 200 watt minimum lamps.

6. Interiors of switchgear and motor control centers shall be kept clean and dry prior to being energized. Maintain heat inside each unit with one 200 watt lamp located at bottom of each vertical section. Energizing integral condensation heaters shall be acceptable in place of lamps.

G. Cooperation with Work under Other Sections

1. Cooperate with all other trades so as to facilitate the general progress of the work. Allow other trades every reasonable opportunity for the installation of their work and the storage of their materials.

2. The work under this section shall follow the general building construction closely. Set all pipe sleeves, inserts, etc., and see that openings for cases, pipes, etc., are provided before concrete is placed or masonry installed.

3. Work with other trades in determining exact locations of outlets, conduits, fixtures, and pieces of equipment to avoid interference with lines as required to maintain proper installation of other work.

4. Make such progress in work that will not delay the work of other trades. Schedule the work so that completion dates as established by the Engineer are met. Furnish sufficient labor or work overtime to accomplish these requirements if directed to do so.

H. Installation and Connection of Work under Another

Section:

1. Except as otherwise indicated, details of control wiring required for plant instrumentation are not shown; however, ascertain the

requirements and install all wiring as required under those sections.

2. Verify the electrical capacities of all motors and electrical equipment furnished under other sections, or furnished by the Owner, and request wiring information from the Engineer if wiring requirements are different from that specified under this section. Do not make rough-ins until equipment verification has been received.

3. Install all motors, controllers, terminal boxes, pilot devices, and miscellaneous items of electrical equipment that are not integrally mounted with the equipment furnished under other sections. All such equipment shall be securely mounted and adequately supported in a neat workmanlike manner.

I. Cleanup and Test

1. Remove all temporary labels, dirt, paint, grease, and stains from all exposed equipment. Upon completion of work, clean equipment and the entire installation so as to present a first class job suitable for occupancy. No loose parts or scraps of equipment shall be left on the premises.

2. Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer, or with an approved paint.

3. Clean interiors of each item of electrical equipment. At completion of work, all equipped interiors shall be free from dust, dirt, and debris.

4. Test insulation value of each service entrance cable, each feeder cable, and each branch circuit wire. Test shall be made by means of crank-type ohmmeter that impresses 1500 volts DC across the insulation. Each ungrounded conductor shall have its insulation integrity tested after installation within its raceways from termination-to-termination. However, testing shall be made prior to connection to line and load. All such testing shall be done in the presence of the Owner's Representative and the test results shall be submitted for review. Insulation value of each installed cable and wire shall be equivalent to, or greater than 500,000 ohms. Should the test indicate an insulation value of less than 500,000 ohms, the conductor in question shall be replaced and re-tested. This procedure shall be repeated until the conductor is in compliance.

J. Warranty:

1. All electrical equipment (except a specifically indicated otherwise) shall be guaranteed against defects in material and workmanship for a period of one year from date of the Owner's final inspection and acceptance to the effect that any defective equipment shall be repaired without cost or obligation to the Owner.

PART 2 – PRODUCTS

2.01 RACEWAYS

A. Rigid ferrous metallic conduit shall be hot-dipped galvanized steel, inside and out. Conduit couplings shall be threaded steel with hot-dipped galvanized finish. Such conduit shall be Republic, Triangle, Wheatland, or equivalent.

B. Rigid non-metallic conduit shall be Schedule 40 PVC plastic type. Couplings shall be PVC solvent-weld type. Such conduit shall be Carlon, or equivalent.

C. Plastic jacketed rigid metallic conduit shall heavy wall galvanized rigid steel (GRS) and shall have a 40 mil minimum thickness PVC coating on exterior metallic surfaces. Couplings shall be sleeved. Such conduit shall be OCAL, Rob-Roy, or Perma-cote.

D. Flexible liquid tight ferrous metallic conduit shall have extruded thermoplastic cover with interlocked galvanized steel core. The conduit shall be U. L. listed. Such conduit shall be Anaconda, Republic, Electri-flex, or equivalent.

E. Flexible liquid tight non-metallic conduit shall consist of a PVC spiral encased in a flexible PVC jacket. Such conduit installations shall include non-metallic liquid tight fittings. The conduit shall be Carlon Carflex or equivalent.

F. Rigid metallic conduit locknuts shall be galvanized steel in sizes under 2" and galvanized malleable iron on sizes 2 1/2" and larger. Sealing locknuts shall have in addition to that specified above, an integrally fused thermoplastic gasket so that the locknut is rated NEMA-4.

G. Rigid metallic conduit insulating bushings shall be molded canvas bakelite type suitable for operation in 100 degrees C rise over 40 degrees C ambient. Polypropylene bushings shall not be acceptable.

H. Grounding type bushings shall have threaded steel body, insulated throat, and ground lug. Insulated throat shall meet specifications under Article G above.

I. Rigid metallic conduit expansion/deflection fittings shall be water-tight with flexible plastic sleeve that allows 3/4" movements in all directions. Hubs shall be threaded, hot dipped galvanized (HDG) malleable iron. Clamping bands shall be stainless steel. There shall be an equipment ground bonding jumper. Expansion deflection fittings shall be Crouse Hinds, OZ, or equivalent.

J. Rigid metallic conduit hubs shall be liquid-tight type with threaded HDG malleable iron female body, with sealing ring on conduit side and threaded male tapered steel body with hardened steel locknut on box side. Plastic

jacketed hubs shall have 40 mils PVC coating. Such fittings shall be T&B, Crouse Hinds, or equivalent.

K. Chase nipples, reducers, enlargers, "Ericksons", capped els, short els, long els, split couplings and fittings shall be HDG malleable iron threaded type for use with rigid metallic conduit.

L. Rigid metallic conduit bodies shall be HDG malleable iron type with threaded hubs, gasketed cast metal covers with stainless steel screws. All such conduit bodies shall be Crouse-Hinds, or equivalent.

M. Liquid-tight flexible conduit fittings shall consist of HDG steel body with captive grounding ferrule and sealing ring, and compression nut. Connector body shall have nylon insulated throat. Pull-out resistance of each completed connector shall be at least 1 1/2 times U. L. minimum. Such fittings shall be T&B, Crouse-Hinds, Appleton, or equivalent.

N. Rigid metallic conduit boxes shall be HDG cast iron, with threaded integrally-cast hubs, cast metal cover, and stainless steel cover screws. Such boxes shall be Crouse-Hinds, Appleton, or equivalent. Plastic jacketed type shall have 40 mils minimum coating of PVC.

O. Cadmium and electro-galvanized plated devices and hardware shall not be acceptable.

2.02 WIRE & WIRING DEVICES

A. WIRE

1. All conductors for power and control wiring shall be stranded, soft drawn copper.

2. Insulation for Power and Control Circuitry shall be 75°C rated THHN/THWN2 for all installations in conduits, except as specifically noted otherwise.

3. Factory pigmented insulation color for sizes #6 and smaller for power wiring shall be as follows:

a. 150V-to ground, or less:

Phase	Color
A	Red
B	Black
C	Blue
Grounding Conductor	Green
Grounded Conductor	White

b. Greater than 150V-to-Ground:

Phase	Color
A	Brown
B	Purple
C	Yellow
Grounding Conductor	Green
Grounded Conductor	Gray

Note The color orange is reserved by the NEC for the "high" leg of a 120/240V, 3-phase, 4-wire voltage classification.

4. Bare conductors for grounding purposes shall be hard-drawn stranded copper.

B. Connectors

1. Mechanical connectors shall be bolted pressure type with tin-plated bronze body and tin-plated silicon-bronze hardware.

2. Insulated spring wire connectors shall be plated spring steel with thermoplastic jacket. Connectors shall be rated at 105° C continuous. Such connectors shall be Ideal, T&B, or equivalent.

3. Insulated set-screw connectors shall consist of copper body with flame-retardant, 600V. Class insulated shell. Such connectors shall be Ideal, T&B, or equivalent.

4. Terminal connectors for flat-head terminal screws shall be locking spade type with vinyl insulated, compression indent shaft, T&B, Ideal, Amp, or equivalent.

5. Terminal strips shall be channel-mounted type with tin-plated solderless box lugs contained with barriered nylon-insulated separable barriers. Such devices shall be Square D, Cutler-Hammer, Allen Bradley, or equivalent.

C. Insulating Products

1. General purpose electrical tape shall be 7 mil thick stretchable vinyl plastic, pressure-adhesive type; Plymouth "Slipknot Grey", 3M "Scotch #33, or equivalent.

2. Insulation putty shall be rubber-based, non-vulcanizing, elastic-type putty in tape form; Plymouth #2074, 3M "Scotchfill", or equivalent.

3. High Temperature, insulating void filling, moisture-proof tape shall be stretchable ethylene propylene rubber with high-tack, self-fusing surfaces. Tape shall be rated for 90 degree Centigrade continuous, 130 degree Centigrade overload. Such tape shall be Plymouth "Plysafe", 3M Scotch 23", or equivalent.

D. Labels, Nameplates, and Signs

1. Marking labels for wire numbering shall be type-on heatshrink plastic. Such labels shall be Raychem "Shrinkmark", or equivalent.

2. Write-on labels for conduit identification shall be weather resistant polyester with flat surface for marking pen application of usage.

3. Colored bonding tape shall be 5 mil stretchable vinyl, self-adhesive, and with permanent solid colors corresponding to here in before specified wire colors; Plymouth "Slipknot 45", 3M "Scotch 35", or equivalent.

4. Three layer phenolic nameplates shall be 3/32" inch thick, lengths as required to accommodate lettering, and in 3/4" and 1 1/4" widths. Each plate shall have adhesive backing with pull-apart resistance of at least 100 PSI. Plates shall be laminated type with black background and white letters.

5. Signs shall be similar to nameplates in 4. above with the size, type, and wording as indicated on the contract drawings.

E. Supporting Devices

1. Slotted channel supports and framing members shall be cold rolled steel. Finish for all locations shall be hot dipped galvanized after fabrication or aluminum. Size of slotted channels unless otherwise indicated, shall be 1-5/8"W x 1-5/8"D in cross-section. Furnish Unistrut P-1000 or equivalent.

2. Beam clamps, side-beam connectors, and one-hole clamps shall be hot dipped galvanized malleable iron, and shall be Steel City, T&B, or Gedney. Plastic coated types shall have 40 mils, minimum PVC covering.

3. Pressed steel, two-piece single bolt, slotted channel conduit straps shall be hot dipped galvanized steel and shall be of the same manufacturer as the slotted channel. Plastic coated types shall have 40 mils, minimum PVC covering and hardware shall be stainless steel.

4. Slotted channel hardware (nuts, bolts, washers, etc.) shall have hot dipped galvanized finish.

5. Concrete and masonry anchors shall be stainless steel type equivalent to Hilti brand.

F. Wiring Devices

1. All wiring devices shall be specification grade, ArrowHart, Hubbell,

or equivalent.

2. Two-pole, 3-wire grounding 20A/125V, NEMA 5-20R duplex receptacle shall be AH #5362, Hubbell #5362, or equivalent.

3. GFCI device shall be a duplex 5-20R, 20 amp, 125 VAC, 3-wire outlet with reset and test pushbuttons P&S #2091, or equivalent. Dry location enclosure shall consist of nylon coverplate. Wet location enclosure shall consist of stainless steel coverplate P&S #4516 on an FD box.

4. Single-pole, single-throw, 20A toggle switch shall be AH #1991, Hubbell #1223, or equivalent.

5. Covers for wiring devices located out-of-doors, and in damp or wet locations shall have stainless steel weather proof cover, gaskets, and stainless steel cover screws.

2.03 DISTRIBUTION EQUIPMENT

A. Safety Switches

1. Safety switches shall be size and type as indicated. Each disconnect means shall be heavy-duty, quick-make, quick-break mechanisms.

2. Unless otherwise indicated, safety switches shall be in a NEMA 4X stainless steel enclosure.

B. Fuses

1. Fuses shall be furnished for each fused over-current device and, in addition, furnish three spare fuses for each rating required shall be furnished.

2. Fuses above 600 ampere shall be constructed using silver links with a fusing alloy soldered to the link for low temperature overload protection. The design shall provide time-delay of not less than 45 seconds at 300% of ampere rating. The interrupting rating shall be at least 200,000 amperes RMS symmetrical.

3. Fuses rated 600 amperes or less shall be dual element Class R, time-delay type. Such fuses shall incorporate separate thermal overload and short circuit elements. The design shall provide time delay of not less than ten seconds at 500% of ampere rating. The interrupting rating shall be 200,000 amperes RMS symmetrical.

4. Fuses shall be Bussman, Chase-Shewmut, or equivalent.

C. Panelboards

1. Panelboards shall be dead-front type and shall be manufactured in accordance with Underwriters' Laboratories, Inc., standard for Panelboards (UL67). Residential load centers shall not be acceptable in lieu of panelboards.

2. The panelboards shall include automatic short circuit and over-current protective devices of the molded case circuit breaker type. All multi-pole breakers shall be so designed that an overload on one pole automatically causes all poles of the circuit breaker to open. The circuit breakers shall be quick-make, and quick-break on manual as well as automatic operation and shall have inverse time trips. Circuit breakers shall have the short circuit interrupting ratings indicated on the drawings.

3. Interiors shall be assembled on reinforced mounting pans or rails which provide protection against damage during handling or installation. Circuit breakers shall be assembled in accordance with the panel schedules included on the drawings. Design shall permit replacement of individual breakers without disturbing adjacent units or without disturbing main bus or branch circuit connectors. Interior design shall permit changing of branch circuits or the addition of circuit breakers to future spaces without additional machining, drilling, or tapping. Main bus bars and branch circuit connectors shall be made of copper. In-and-out adjustments of the panel interior shall be provided.

4. Panel bussing shall be arranged to maintain sequence phasing throughout, that is, adjacent poles shall be of unlike polarity and rotated in sequence. Circuit members shall be provided for each pole space or breaker space as shown on the panel schedule.

5. Cabinets shall be manufactured in accordance with Underwriters' Laboratories, Inc., standard for Cabinets and Boxes (UL 50) and shall provide a minimum of four inches wiring gutter on all sides. Cabinet fronts shall include doors with semi-concealed hinges, combination lock and catch on doors and a directory frame with circuit directory behind clear plastic, mounted on back of door. The front shall be attached to the box with suitable provision to provide proper alignment of trims.

6. Furnish and install sign on front of panel enclosures listing high voltage and low voltage wire color coding scheme as required per NEC 210.5-(C). System color coding shall be as specified herein.

2.04 MISCELLANEOUS

A. Grounding Devices

1. Ground rods shall be copper clad steel in lengths and diameters as indicated.

2. Ground rod connectors shall be copper alloy with silicon bronze bolts and in sizes to fit ground rod diameters. Furnish OZ, Burndy, or equivalent.

3. Pipe ground connectors shall be copper alloy with silicon bronze bolts and in sizes to fit pipe diameter. Furnish OZ, Burndy, or equivalent.

4. Thermal welding devices shall consist of correct size molds to fit application and correct amount of weld metal. Furnish Enrico "Cadweld", Burndy "Thermoweld", or equivalent.

2.05 ELECTRO-MECHANICAL LOW VOLTAGE MOTOR CONTROLLERS:

A. Non-Reversing Starters:

1. Across-the-line magnetic starters for motors up to 100 HP, 600 volts, shall be built and tested in accordance with the latest NEMA standards.

2. Starters shall be equipped with three overload relays. Overload shall be block-type with a push-to-test feature. An isolated, field mountable alarm contact should be available. Starter shall provide for field installation of up to 3 NO and 4 NC auxiliary contacts in addition to the hold-in interlock.

B. Combination Non-Reversing Starters:

1. Across-the-line combination starters for motors up to 100 HP, 600 volts, shall be Motor Circuit Protector (MCP) of fused switch type. They shall be built in accordance with the latest NEMA standards. Combination starter units shall be full voltage non-reversing, unless shown otherwise, and shall utilize Motor Circuit Protectors (MCP) or fuse switches. Each combination unit shall be rated 65,000 AIC symmetrical at 480V. The MCP shall provide adjustable magnetic protection and be provided with pin insert to stop magnetic adjustment at 1300 percent motor nameplate full load current to comply with NEC requirements. All MCP combination starter units shall have a "tripped" position on the unit disconnect and a push-to-test button on the MCP. Motor circuit protectors shall include transient override feature for motor inrush current.

2. Starters shall be equipped with three overload relays. Overload shall be block-type with a push-to-test feature. An isolated, field-mountable alarm contact shall be available. Starter shall provide for field installation of up to 3 NO and 4 NC auxiliary contacts in

addition to the hold-in interlock.

3. Operating handle shall always remain connected to the breaker or switch. The operating handle shall not be mounted in the door of the enclosure, but to the side of the door for safe "stand-aside" operation. Position of operating handle shall indicate ON, OFF, or Tripped condition of switch or circuit breaker.

4. Interlock provisions shall prevent unauthorized opening or closing of the starter door with the disconnect in the "ON" position.

5. Controller contactors shall be electrically operated, electrically held, three pole assemblies with arc extinguishing characteristics and shall have silver-to-silver renewable contacts.

6. Each starter shall be equipped with a fused control power transformer, two indicating lights, HOA selector switch, and two normally open (NO) contacts, unless otherwise scheduled on the drawings. All pilot lights shall be push-to-test transformer type.

7. Except as otherwise noted, each controller shall be equipped with a fused 120V control power transformer. Each CPT shall be sized to handle its contactor coil load plus internal and external connected loads as indicated on the plans.

8. Motor controllers shall be Cutler-Hammer, Square D, or engineer accepted equivalent.

2.06 LIGHTING FIXTURES

A. General:

1. Lighting fixtures shall be furnished as specified the LIGHTING FIXTURE SCHEDULE and as additionally described or detailed on the contract drawings and as specified under this section.

2. Fixture lamps shall be furnished as indicated per the LIGHTING FIXTURE SCHEDULE as detailed on the contract drawings.

3. Each fixture shall be complete with it appropriate hardware, finish trims, and appurtenances as required for a finished installation.

4. Fluorescent ballasts shall be Premium Class P, type "LH" (low heat rise) and each ballast shall have two year warranty on parts and labor. Warranty shall cover either defective or noisy ballasts. Each ballast shall be CBM certified.

5. All H.I.D. ballasts shall be constant wattage, autostabilized, high power factor type. Each H.I.D. ballast shall have two year warranty on parts and labor.

6. Fixtures shall be free from light leaks, exposed screws, pointed projections, sharp edges, scarred, marred, and scratched finishes.

7. All H.I.D. lamp sockets shall be mogul base, porcelain screw shell. All fluorescent sockets shall be spaced properly to allow for correct length fit and contacts shall be silver plated, edge-wiped type.

8. All fixture lenses shall be free from bubbles, cracks, warpage, chips and scratches.

9. All fixtures specified for damp or wet locations or specified for out-of-doors shall be suitable for the environment and each such fixture shall bear UL "DL" label. Such fixtures shall not rust, discolor or show signs of deterioration after one year's service. Each fixture shall be gasketed to prevent the entrance of moisture and sealed to prevent the entrance of insects. Electrical fittments shall be so protected that continuous exposure to sunlight and moisture shall not cause failure.

2.07 LOW VOLTAGE TRANSFORMERS

1. All general purpose dry-type transformers shall be 150° C rise over 40° C ambient and shall have KVA ratings and voltage as indicated.

2. Core and coils shall be housed in a ventilated NEMA rated enclosure appropriate for the location.

3. Core and coils shall be equipped with NEMA standard full capacity taps in the high voltage windings. Windings shall be copper.

4. Short-time overload capability shall be in accordance with ANSI C57.12.

5. Noise levels guaranteed for each transformer shall be no more than the following when measured by ANSI C89.1:

   a. 50 KVA and below - 45
   b. 51 KVA and through 300 KVA - 50 db

6. Dry type transformers shall be Cutler-Hammer, Jefferson, Sorgel, or engineer accepted equivalent.

2.08 PROTECTIVE DEVICE TIME-CURRENT COORDINATION ANALYSIS & ARC-FLASH STUDY:

1. A time-current coordination and arc-flash study for the proposed low voltage distribution systems at the well site shall be performed and submitted for review. The time-current coordination and arc-flash analysis shall be performed with the aid of a digital computer and shall include the determination of settings, ratings, or types for the over-current protective devices supplied. The study shall be commenced immediately upon award of the contract so that any required changes can be made during the submittal process. Any required changes due to the failure of the contractor to provide the study in a timely manor will be made at the contractor's expense.

2. Where necessary, an appropriate compromise shall be made between system protection and service continuity with system protection and service continuity considered to be of equivalent importance.

3. A sufficient number of computer generated log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current characteristics of series connected over-current devices and other pertinent system parameters.

4. Computer printouts shall accompany the log-log plots and shall contain descriptions for each of the devices shown, settings of the adjustable devices, the short-circuit current availability at the device location when known, and device identification numbers to aid in locating the devices on the log-log plots and the system one-line diagram.

5. The study shall include a separate, tabular computer printout containing the suggested device settings of all adjustable over-current protective devices, the equipment where the device is located, the device number corresponding to the device on the system one-line diagram, and the number of the time-current log-log graphs where they are illustrated.

6. A computer generated system one line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers, and the maximum available short circuit current at each bus when known.

7. A discussion section which evaluates the degree of system

protection and service continuity with over-current devices, along with recommendations as required for increasing system protection or device coordination. This section shall include a simple statement in laymen's terms addressing any problems that may exist and suggestions for their remedy.

8. Bound copies of the completed protective device time-current coordination analysis shall be submitted for review.

9. The supplier shall set all devices in the field according to the analysis during the commissioning of the equipment.

10. The arc-flash study shall be in accordance with the applicable NEMA, ANSI, IEEE, and OSHA standards. The study shall be include the level of arc-flash hazard for each item of electrical equipment and the appropriate level of personal protective equipment required per OSHA standards. The contractor shall provide required arc-flash hazard warning signs for delivery to the owner for posting by the owner.

2.09 POLE LINE HARDWARE:

A. Pole Line Hardware

1. Pole line hardware shall be hot dipped galvanized. It shall be that as manufactured by A. B. Chance, Joslyn, or equivalent. NOTE: All non-current carrying metal parts are to be bonded to pole ground wire attached to ground rod at each pole.

B. Wood Poles

1. Wood pole length and class shall be as indicated on the drawings. Poles shall be set to a depth of 10% of pole length plus 2 feet. Backfill shall be tamped in 6" lifts and excess dirt shall be mounded around base of pole to provide drainage away from pole. Poles will be southern pine, creosote treated to 10 pounds retention. Certificate of treatment shall be provided as submittal information. Location of poles is approximate on drawings. Final locations shall be confirmed with the owner in advance of construction. Poles shall be straight and free of crooks and knots. NOTE: Each pole shall have #6BSDC ground wire, ground mold, and ground rod.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Basic Materials and Methods

1. Install the conduit system to provide the facility with the utmost degree of reliability and maintenance free operation. Kinked conduit, conduit inadequately supported or carelessly installed shall not be accepted.

2. Raceways shall be installed for all wiring runs except as otherwise indicated.

3. Conduit sizes, where not indicated, shall be code-sized to accommodate the number and diameter of wires to be pulled into the conduit. Use NEC tables for sizing.

4. Exposed runs of conduit shall be installed parallel to the lines of the structure.

5. All above grade conduit and fittings (except as specifically noted otherwise) shall consist of galvanized rigid steel conduit and fittings. See "Typical Conduit Detail" on the contract drawings.

6. PVC runs shall be joined with manufacturer's approved cement.

7. Finished installation of conduit runs from each terminus to each terminus shall be watertight.

8. Generally, raceways shall be installed exposed in the buildings and on the structures, except as otherwise specified. Horizontal runs shall be supported on 24" centers and vertical runs on 48" centers.

9. Yard runs of conduit shall be direct buried schedule 40 PVC plastic conduit and fittings. Depth of lateral runs shall be 24" minimum and 36" maximum, unless otherwise indicated. Coordinate installation with site work finished grades. See "Typical Conduit Detail" on the contract drawings.

10. Conduit bodies such as "LB, "T", Condulets, Unilets, or equivalent shall be installed in exposed runs of conduit wherever required to overcome obstructions, and to provide pulling access to wiring. Covers for such fittings shall be accessible and unobstructed by the adjacent construction. The use of wireways and junction boxes shall be held to a minimum. The use of wireways and junction boxes shall be coordinated with the engineer before installation.

11. Conduit shall enter all wireways, boxes, motor control centers, panelboards and other enclosures straight and true. Conduits installed cocked and not parallel to the lines of the enclosure shall not be acceptable.

12. Plastic jacketed flexible metallic (2" and larger)or non-metallic conduit (below 2") shall be used for connections to motors, electric valve operators, HVAC equipment, motorized louvers, lay-in lighting

fixtures, and other devices that may need to be removed for servicing.

13. Flexible conduit runs shall consist of liquid tight conduit only. Flexible conduit runs shall be joined with specified connectors and the connectors shall be made up tightly onto the lengths of flex and onto its connected devices. All plastic jacketed flexible conduit connections shall be watertight.

14. Cap each end of conduits as soon as placed to prevent mud, dirt, debris, and water from entering raceways. Each run shall be swabbed clean prior to wire pulling.

15. All junction and pull boxes shall be equipped with blank covers.

16. All boxes shall be installed with their axes parallel to the lines of the building structure.

17. All conductors shall be the size as indicated and where no size is given, the conductor size shall be #12 AWG, unless otherwise specified.

18. Generally, control wiring shall be #14 AWG.

19. All wiring shall be installed in raceways unless otherwise indicated.

20. All power and control wiring shall be made with insulated, stranded copper wire.

21. No wire or cable shall be drawn into a conduit, until all work of a nature which may cause injury to the wire, is completed. A cable pulling compound shall be used as a lubricant and its composition shall not affect the conductor or its insulation.

22. Do not exceed cable manufacturer's recommended pulling tensions.

23. Service and feeder wiring runs shall be made from terminus to terminus without splice except for yard runs which may be spliced in junction boxes or manholes.

24. Branch circuits shall run from supply to load without splice except where taps and splices are required for receptacle, light fixture, and small appliance loads.

25. Taps, splices, and connections in #8 AWG and larger shall be made with tinned copper alloy bolted pressure connectors. Make up connection tightly to produce as low a resistance as if the conductor where continuous. Such connectors shall be insulated with a smooth cover of void-filling insulation putty and then covered with at least four (4) half lapped layers of electrical tape. Insulated connector shall have at least 1-1/2 KV insulation value.

26. Except as otherwise specified; taps, splices, and connections with #10 AWG and smaller shall be made with insulated spring wire connectors. Such connectors in damp or wet locations shall be further insulated with an envelope of half-lapped EPR over the wire nut and down 1/2" over the incoming wires; prior to applying the envelope, use a stretched piece around each wire to fill the interstices between the wires; finished splices shall be waterproof.

27. Specified sizes of wire shall be installed with factory-pigmented colors. Phase label black pigmented wires with colored banding tape as specified. Install labels at each terminus.

28. Numbered marking labels shall be installed to identify circuit numbers from panel boards and to identify control wires. Install labels on each wire in each panelboard, junction and pullbox, and device and control connection.

29. Label each wiring run with write-on waterproof labels inside each motor controller panelboard, pullbox, and handhole. Wrap label ties around wire group at conduit entrance and write on label the wire size, conduit size, and service.

30. Control wiring that terminates onto flat head type terminals shall be equipped with crimp-type spade lugs. Label each wire with number to correspond with terminal strip number.

31. All wiring inside enclosures shall be neatly trained and laced with tie-wraps.

32. All raceway systems, outlets, boxes, wireways, cabinets, enclosures, lighting fixtures, transformers, and related equipment shall be adequately and safely supported with at least 3-1 safety factor.

33. Slotted channels shall be used to support equipment that is mounted free of structure. Use factor fabricated back-to-back hot-dipped galvanized members with dimension of 1-5/8" X 3-1/4" deep that have hot-dipped galvanized factory fabricated welded feet.

34. Runs of exposed conduits shall be installed as follows:

    a. Single surface runs shall be attached to the structure by means of conduit clamps, except as otherwise specified. Single runs along structural members shall be supported by means of side beam clamps, or similar supporting devices.

    b. Multiple surface runs shall be attached to the structure by means of slotted channels. Each conduit shall be attached to the slotted channel by means of two-piece conduit clamps.

35. Slotted channels that are field cut shall have raw edges painted with cold galvanized coating spray paint.

36. All conduits (and tray cables) shall include an NEC-250 sized insulated equipment ground conductor.

B. Equipment

1. Panelboards, motor controllers, and electrical enclosures shall be installed as follows:

a. Follow manufacturer's installation instructions. Install enclosures plumb and level. Bolt enclosures to concrete with 1/4" (minimum) diameter stainless steel bolts in Hilti type concrete anchors.

b. Conduit entries into enclosures shall be carefully arranged and equipped with insulating bushing. The use of reducing washers shall not be allowed.

c. All cables inside enclosures shall be neatly arranged and bundled and bound with plastic tie-wraps.

d. Tighten all wire and busbar connectors to factory recommended torque settings using a torque wrench. Coat all wiring terminations with an ample amount of anti-corrosion compound, T & B Kopr-shield or equivalent.

3.02DRAWINGS AND SUBMITTALS

A. Submit shop drawings for the following:

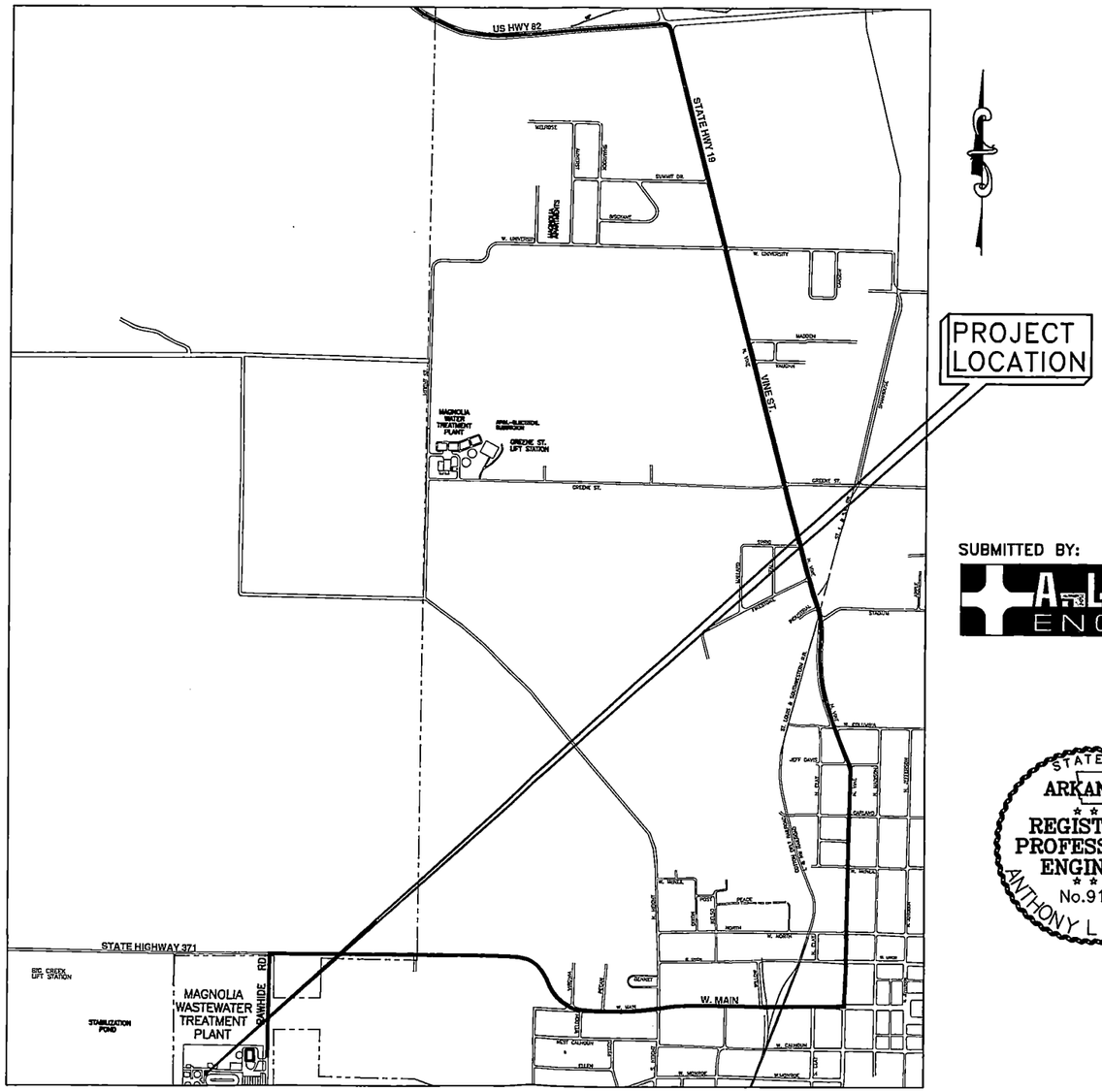
1. Wire
2. Conduit-all types
3. Safety Switches
4. Pilot Devices
5. Enclosures
6. Terminal Blocks
7. Panelboards
8. Motor Controllers
9. Transformers
10. Lighting Fixtures

B. Submit catalog literature of each item of material specified.

END OF SECTION

CITY OF MAGNOLIA, ARKANSAS
MAGNOLIA WASTEWATER FACILITY
CHEMICAL FEED SYSTEM

INDEX TO SHEETS



VICINITY MAP

BEFORE CONSTRUCTION BEGINS
GIVE 48 HOURS NOTICE
FOR UNDERGROUND UTILITY LOCATIONS
CALL: THE ARKANSAS ONE-CALL SYSTEM 1-800-482-8998

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE-CALL SYSTEM

APPROVED BY:

MAGNOLIA WASTEWATER COMMISSION

PARNELL VANN
ALLEN PINNER
BILLY TUCKER

CITY OF MAGNOLIA, ARKANSAS

PARNELL VANN, MAYOR — DATE

RUSSELL THOMAS, SUPERINTENDENT — DATE

COUNCIL MEMBERS

STEVE CROWELL	JAMES JEFFERSON, JR.
KELLI SOUTER	JEFF WHITE
JAMES MOORE	LARRY TALLEY
JAMIE WALLER	GARY FARRAR

SUBMITTED BY:

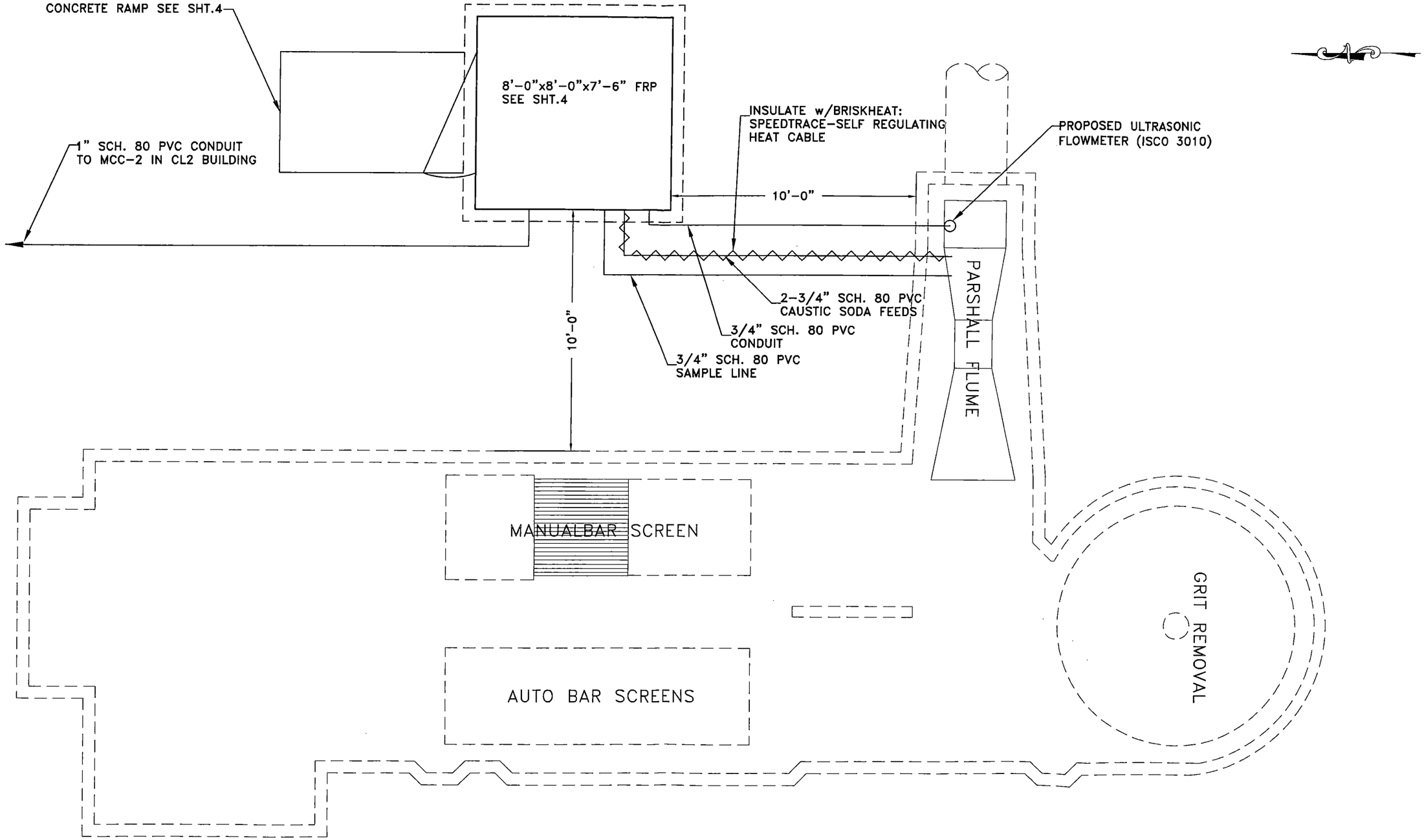
A.L. FRANKS ENGINEERING
118 E. Broad Street
Texarkana, Arkansas 71854
Phone (870) 216-1906
Fax (870) 216-1907

CERTIFICATE OF AUTHORIZATION A.L. FRANKS ENGINEERING, INC. NO. 1681 ARKANSAS ENGINEER

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No.9192 ANTHONY L. FRANKS

2/28/18
ANTHONY L. FRANKS, P.E. PRINCIPAL — DATE

2/28/18
DAVID STEWART PROJECT MANAGER — DATE



Date	Revision	By

Designed DSS
Checked DSS
Drawn DSS
Approved ALF

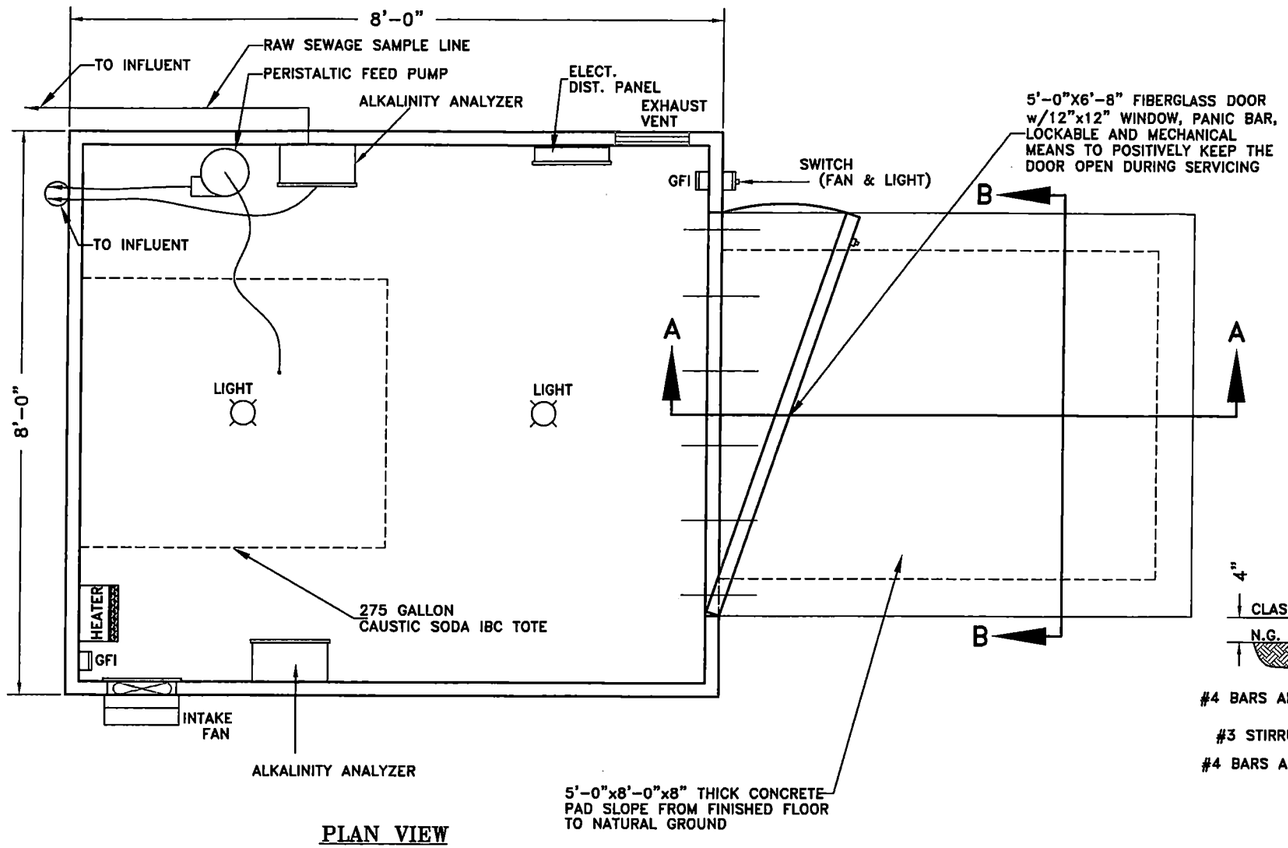
A.L. FRANKS ENGINEERING
118 East Broad Street
Texarkana, Arkansas 71854
Phone (870) 216-1906
Fax (870) 216-1907

CITY OF MAGNOLIA, ARKANSAS
MAGNOLIA WASTEWATER FACILITY
CHEMICAL FEED SYSTEM

PROPOSED
PIPING
PLAN

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.9192
ANTHONY L. FRANKS

Job No.: MG-02-18
Scale: 1/4"=1'-0"
Date: FEBRUARY 2018
Sheet 3 of 4



PLAN VIEW
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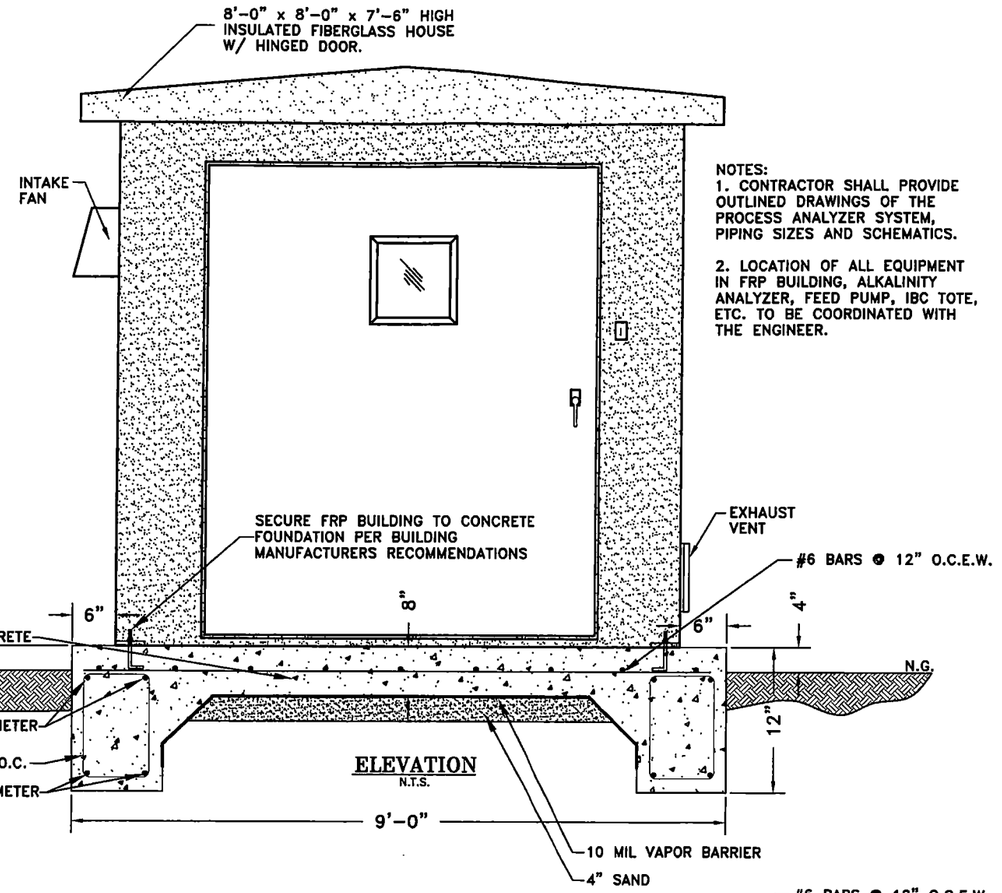

ELEVATION
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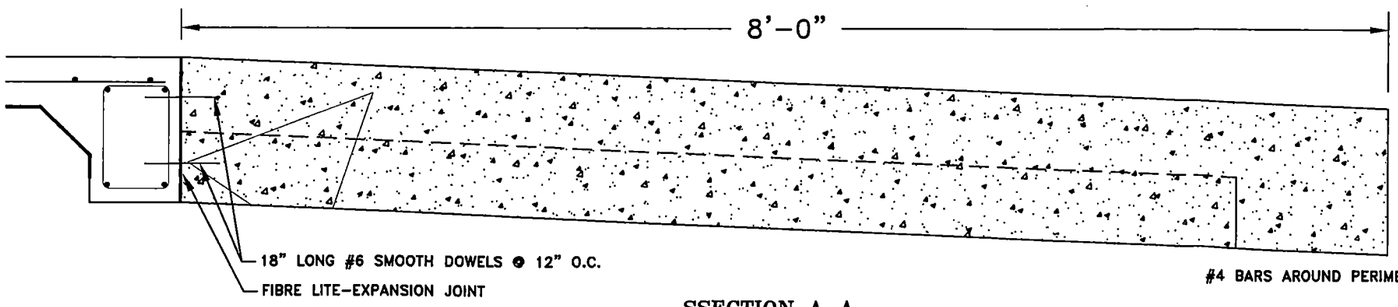

SSECTION A-A
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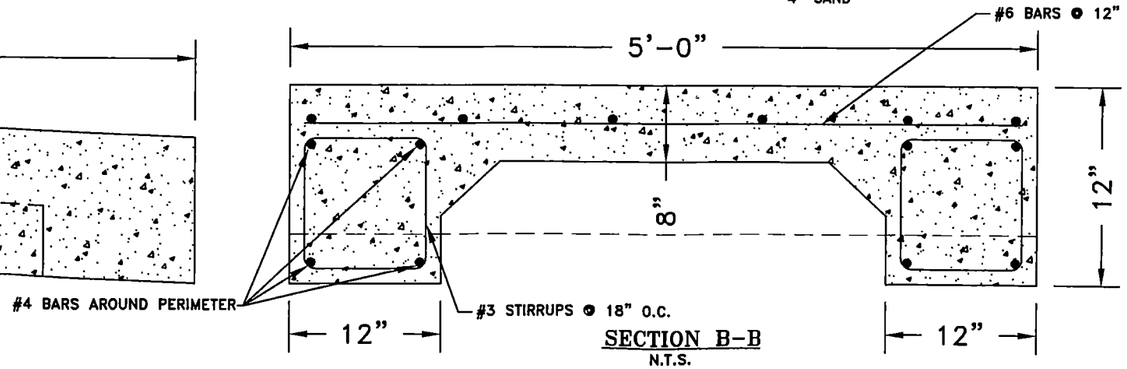

SECTION B-B
N.T.S.

Date	Revision	By

Designed DSS
Checked DSS
Drawn DSS
Approved ALF

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CITY OF MAGNOLIA, ARKANSAS
MAGNOLIA WASTEWATER FACILITY
CHEMICAL FEED SYSTEM

PROPOSED
FRP BUILDING
AND FOUNDATION

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No.9192 ANTHONY L. FRANKS

Job No.: MG-02-18
Scale: AS SHOWN
Date: FEBRUARY 2018
Sheet 4 of 4

GENERAL NOTES:

1. CONTRACTOR SHALL NOTIFY MAGNOLIA WASTEWATER SYSTEM SUPERINTENDENT RUSSELL THOMAS (870) 904-1694 72 HOURS PRIOR TO CONSTRUCTION.

2. ALL EQUIPMENT SHALL BE: CHEMSCAN BY ASA ANALYTICS AS SUPPLIED BY INSTRUMENT & SUPPLY, INC., HOT SPRINGS, AR TEL. (501) 262-3282 OR APPROVED EQUAL.

3. CONTRACTOR SHALL USE THE EXISTING ELECTRICAL COMPONENTS IN PANEL LPA OF THE MCC-2 LOCATED IN THE CHLORINE BUILDING.

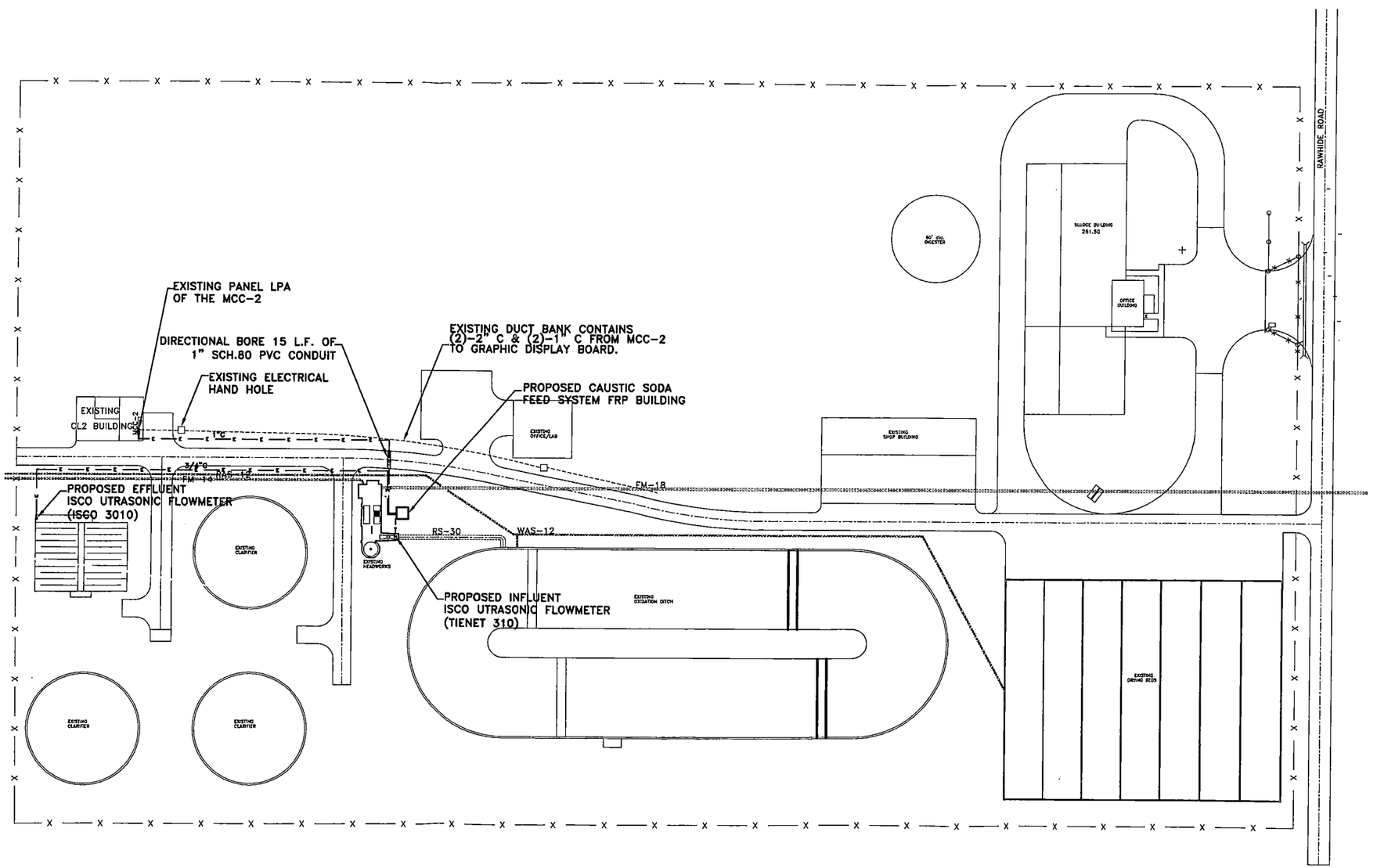
4. CONTRACTOR SHALL PROVIDE AND INSTALL 4" OF TOPSOIL, GRASS, AND FERTILIZER OVER ALL DISTURBED AREAS.

5. PIPING SHALL BE SCHEDULE 80 PVC WITH SOLVENT WELD AND SCHEDULE 80 FITTINGS.

6. IT IS RECOMMENDED THAT THE CONTRACTOR VISIT AND FAMILIARIZE HIMSELF WITH THE PROJECT, AND PREPARE A SEQUENTIAL SCOPE OF WORK PLAN (DIAGRAMS, EQUIPMENT LOCATIONS; etc.) FOR THE ENGINEERS APPROVAL.

7. CONTRACTOR IS RESPONSIBLE AND LIABLE FOR ANY DAMAGE TO EXISTING STRUCTURES AND/OR EXISTING UTILITIES WHETHER SHOWN OR NOT SHOWN ON THESE DRAWINGS DURING CONSTRUCTION.

8. ALL ELECTRICAL COMPONENTS SHALL BE CONNECTED PER MANUFACTURERS RECOMMENDATIONS. CONTRACTOR SHALL SUBMIT TO THE ENGINEER A ELECTRICAL PLAN (WIRE SIZES, SIGNALS, CONNECTIONS ETC.) FOR APPROVAL.



Date	Revision	By

Designed DSS
Checked DSS
Drawn DSS
Approved ALF

A.L. FRANKS ENGINEERING
118 East Broad Street
Texarkana, Arkansas 71854
Phone (870) 216-1906
Fax (870) 216-1907

CITY OF MAGNOLIA, ARKANSAS
MAGNOLIA WASTEWATER FACILITY
CHEMICAL FEED SYSTEM

EXISTING
WWTP LAYOUT
& GENERAL NOTES

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No.9192 ANTHONY L. FRANKS

Job No.: LB-02-16
Scale: 1"=80'
Date: FEBRUARY 2016
Sheet 2 of 15

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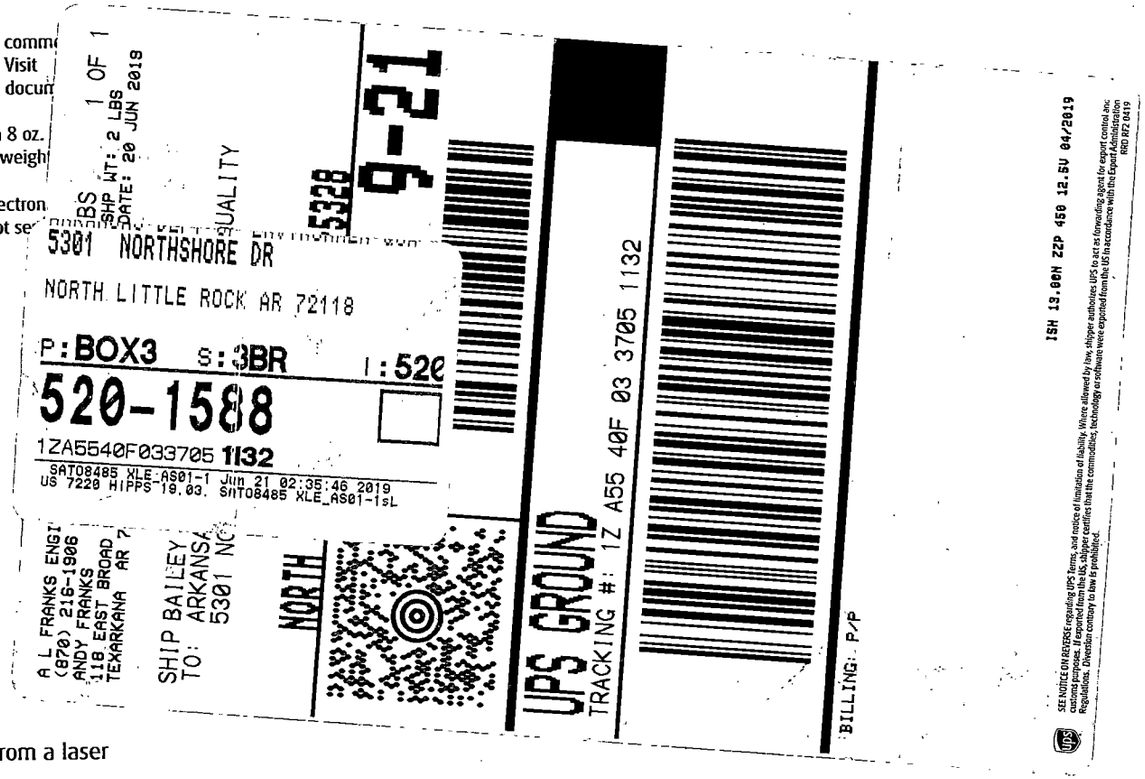

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