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CONTRACT DOCUMENTS

AND

CONSTRUCTION SPECIFICATIONS

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FOR

SEABROOK FLOODWALL EXTENSION

FLOODWALL AND FLOODGATE CONSTRUCTION

OLB PROJECT NO. 2042-0344

FOR

THE BOARD OF LEVEE COMMISSIONERS

OF THE

ORLEANS LEVEE DISTRICT

Prepared BY:

WALDEMAR S. NELSON AND COMPANY
Incorporated
Engineers and Architects

1200 St. Charles Avenue
New Orleans, Louisiana 70130

FILE 1005-3

DISTRIBUTION

WB
JH

ISSUED BY:

Waldemar S. Nelson & Co., Inc.

FOR APPROVAL

WSNCO Job No. 85063

May, 1986

MAY 19 1986

NOT FOR CONSTRUCTION

BOARD OF COMMISSIONERS
OF THE ORLEANS LEVEE DISTRICT
SEABROOK FLOODWALL EXTENSION
OLB CONTRACT NO. 2042-0344

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INVITATION TO BID

Sealed proposals for the construction of SEABROOK FLOODWALL EXTENSION, FLOODWALL AND FLOODGATE CONSTRUCTION will be received by THE BOARD OF LEVEE COMMISSIONERS OF THE ORLEANS LEVEE DISTRICT at the office of the BOARD, Suite 202 Administration Building, New Orleans Lakefront Airport, New Orleans, Louisiana 70126, until 2:00 p.m. (local time) May , 1986. and then publicly opened and read aloud.

The project consists of construction of approximately 1,438 linear feet of floodwall and levee consisting of both "I" and "T" types including floodgates at the Seabrook Bridge (South Service Road), at France Road and the Southern Railway Railroad tracks together with levee construction, revision of existing utilities and related work all on the west side of the I.H.N.C.

Contract documents, drawings and specifications may be obtained at the office listed above upon payment of \$50.00 (Fifty) for each set. No refund will be made for the return of the drawings and specifications.

Drawings and specifications may be examined at the office of the Engineer, Waldemar S. Nelson and Company, Inc., or at the office of the Board.

Bid security in the form of a cashier's or certified check or bid bond in the amount of five (5%) percent of the total bid shall accompany each proposal.

The bidder to whom the contract is awarded will be required to furnish a Performance and Payment Bond acceptable to the Board for one hundred (100%) percent of the contract amount in conformity with the Contract Documents.

The Board reserves the right to reject any or all bids and to waive any informalities in the public interest.

Bids must be submitted on forms provided by the Board. Envelopes containing bids and bid guarantee must be sealed, marked with the project name, and with the Contractor's name, and Louisiana Contractor's License number including all major classifications, sub-classifications and specialty classifications shown thereon.

A Pre-Bid Conference is scheduled for _____ (local time) at the office of the Chief Engineer, Suite 202 Administration Building, New Orleans Lakefront Airport on _____. All interested parties are encouraged to attend.

C. E. Bailey
Chief Engineer

OLB PROPOSAL NO. 2042-0344
SEABROOK FLOODWALL EXTENSION

PROPOSAL OF _____

ADDRESS _____

TELEPHONE NUMBER _____

DATE _____

Mr. Emile W. Schneider, President
Board of Levee Commissioners
of the Orleans Levee District
Suite 202 Administration Building
New Orleans Lakefront Airport
New Orleans, Louisiana 70126

Dear Sir:

_____ propose to furnish all material, labor, fuel, supplies and
equipment, etc., and to perform all work necessary to construct the OLB
Proposal No. 2042-0344 Seabrook Floodwall Extension, New Orleans, Louisiana,
at the prices shown in the attached Bid Schedule.

TOTAL OF BID ITEMS FROM ATTACHED BID SCHEDULE (in words and numerals):

_____ (\$_____).

The Board of Levee Commissioners of the Orleans Levee District reserves the
right to reject all bids.

_____ propose to complete all work under this proposal, in accordance
with the specifications, and to the complete satisfaction of the Chief
Engineer within _____ CONSECUTIVE CALENDAR DAYS from date of
work order.

OLB PROPOSAL NO. 2042-0344

SEABROOK FLOODWALL EXTENSION

_____ agree that in default of completing all work within the period of time stipulated above to be bound in the amount of FIVE HUNDRED DOLLARS (\$500.00) LIQUIDATED DAMAGES, not as Penalty, for each Calendar Day beyond the stipulated time.

_____ deposit with this proposal _____

(Mark type of deposit furnished)

as a guarantee that _____ will within twelve (12) days after receipt of written notice from the Board of Levee Commissioners of the Orleans Levee District that award is made, submit properly completed insurance certificates evidencing all required coverages as set forth in the general specifications, Paragraph 1.11, and enter into a Notarial Contract, before a Notary, chosen by the Board of Levee Commissioners of the Orleans Levee District, whose fee will be paid by _____ (me or us).

_____ certify that in Contracts involving bids of \$50,000.00 or more, we have been duly licensed by the State Licensing Board for Contractors in accordance with LA R.S. 37:2151 thru R.S. 37:2163, and that my current license is No. _____.

_____ hereby acknowledge receipt of Addendum No. _____, _____, _____.

Name _____

Title _____

PROPOSAL FORM

OLB PROPOSAL NO. 2042-0344
 SEABROOK FLOODWALL EXTENSION
 FLOODWALL AND FLOODGATE CONSTRUCTION

BID SCHEDULE
 SEABROOK FLOODWALL EXTENSION
 FLOODWALL AND FLOODGATE CONSTRUCTION
 OLB PROJECT NO. 2042-0344

No.	Item	Unit	Unit Price	Approx. Quantity	Amount
1.	Mobilization and Demobilization	LS	\$ _____		\$ _____
2.	Clearing & Grubbing	LS	\$ _____		\$ _____
3.	Removal of Hayne Blvd. Asphalt	SY	\$ _____	960	\$ _____
4.	Removing & Reconst. of Fence	LF	\$ _____	350	\$ _____
5.	Removing Pipelines 4" to 12" dia.	LF	\$ _____	500	\$ _____
6.	Railroad Work	LS	\$ _____		\$ _____
7.	Embankment, Semi-compacted Fill	CY	\$ _____	11,650	\$ _____
8.	Structural Excavation & Backfill	LS	\$ _____		\$ _____
9.	Piling, Concrete Precast				
	Prestressed 12" dia.	LF	\$ _____	1,120	\$ _____
	14" dia.	LF	\$ _____	1,340	\$ _____
10.	Piling Steel Sheet, Type PZ-27 or Equivalent	SF	\$ _____	22,620	\$ _____
11.	Piling Steel Sheet, Type PSA-23 or Equivalent	SF	\$ _____	600	\$ _____
12.	Modifications of Existing Utilities	LS	\$ _____		\$ _____
13.	Incidental Paving	LS	\$ _____		\$ _____
14.	Reinforced Concrete Floodwalls	LS	\$ _____		\$ _____

No.	Item	Unit	Unit Price	Approx. Quantity	Amount
15.	Structural Steel Gates, Misc. Metals and Speciality Items	LS	\$ _____		\$ _____
16.	Temporary Shell Road at Gate No. 1	LS	\$ _____		\$ _____
17.	Relief Well System	LS	\$ _____		\$ _____
	a. Relief Well Screen	LF	\$ _____		\$ _____
	b. Relief Well Riser	LF	\$ _____		\$ _____
	c. Corrugated Metal Pipe				
	24-inch diameter	LF	\$ _____	245	\$ _____
	12-inch diameter	LF	\$ _____	50	\$ _____
	d. Manhole Covers	EA	\$ _____	7	\$ _____
	e. Outlet Pipe Guard Screens	EA	\$ _____	7	\$ _____
	f. Relief Well Check Valves	EA	\$ _____	7	\$ _____
	g. Concrete Paving	LS	\$ _____		\$ _____
	h. Plugging Abandoned Relief Wells	EA	\$ _____		\$ _____
	i. Plugging Abandoned Holes	EA	\$ _____		\$ _____
	j. Relief Well, Pumping Test, 4 hours		\$ _____		\$ _____
	k. Relief Well, Additional Pumping		\$ _____		\$ _____
18.	Drain Line at Seabrook Bridge	LS	\$ _____		\$ _____
19.	Degrade Levee	LS	\$ _____		\$ _____
20.	Seeding & Fertilizing	LS	\$ _____		\$ _____

BIDDER'S INFORMATION FORM

INFORMATION TO BE FURNISHED WITH BID

The information furnished below is necessary for the drafting of a notarial contract; however, it does not constitute a part of the contract documents.

PLEASE PRINT OR TYPE IN BLANK SPACES

1. Bidder is

If bidder is an individual, use paragraph (a) and ignore pars. (b) and (c).

(a) _____
(full name)
residing at _____
(street, city, and zone number)
or doing business at _____
(street, city, and zone number)
and is sole owner of, and doing business as,

(trade name)

If bidder is a partnership, use paragraph (b) and ignore pars. (a) and (c).

(b) A commercial co-partnership composed of the following partners:

(Give names of all partners)

doing business as _____
(trade name)
domiciled at _____
(street, city, and zone number)
in the state of _____ and which contract will be signed by
_____ a member of the co-partnership.
(Name of co-partner)

If bidder is a corporation, use paragraph (c) and ignore pars. (a) and (b).

(c) A corporation organized under the laws of the State of _____,
domiciled at _____, authorized
(city and state)
to do and doing business in the State of Louisiana, whose address in New Orleans is _____,
(street, city, and zone number)
and which contract will be signed by _____,

(name and title of officer) Officer who signs contract

for successful bidder must furnish Notary with an extract of minutes of corporation's Board of Directors showing his authority to act for the corporation.

2. The following named surety company in the City of New Orleans, Louisiana, will execute the bond as surety for the bidder:

BIDDER'S EXPERIENCE FORM

INFORMATION FURNISHED WITH BID

CONTRACTOR'S EXPERIENCE

Under our present title, as given immediately below,
(or under other titles, if any, also stated)

FIRM NAME	NATURE OF BUSINESS	ORGANIZED

Work, comparable in kind and extent to that covered by the accompanying
bid, has been performed by us, as follows:

DESCRIPTION OF WORK AND WHERE PERFORMED	OWNER	DATE OF COMPLETION	CONTRACT PRICE

(Bidder's Signature)

CONTRACT

CONTRACT AND BOND BETWEEN

THE BOARD OF LEVEE COMMISSIONERS

OF THE

ORLEANS LEVEE DISTRICT

and

UNITED STATES OF AMERICA

STATE OF LOUISIANA

PARISH OF ORLEANS

CITY OF NEW ORLEANS

BE IT KNOWN, that on this _____
 day of the month of _____
 in the year of OUR LORD One Thousand
 Nine Hundred and Eighty -
 of the Independence of the United
 States of America, the Two Hundred
 and

B E F O R E M E

a Notary Public in and for the Parish
 of Orleans, State of Louisiana, duly
 commissioned and qualified, therein
 residing, and in the presence of the
 witnesses, hereinafter named and
 undersigned:

PERSONALLY CAME AND APPEARED:

1st: _____ herein representing and acting for the
 Board of Levee Commissioners of the Orleans Levee District, an Agency of the
 State of Louisiana, by virtue of a Resolution of said Board, a duly certified
 copy of which Resolution is attached hereto and made part hereof.

2nd: _____, hereinafter called the
 "Contractor", appearing through _____, whose
 authorization to represent the said Contractor herein, is attached hereto and
 made part hereof.

Who declared, that for and in consideration of the payment, hereinafter provided
 for, to be made by said Board of Levee Commissioners of the Orleans Levee District,
 the said Contractor agrees and is obliged to furnish all labor, equipment,
 supplies, etc., and to perform all work necessary for the

O.L.B. CONTRACT NO. 2042-0344

in accordance with the specifications identified herewith, at the following total prices:

The Contractor agrees to complete all work contracted for within the period of time stipulated in the signed proposal, which in this instance is 180 (one hundred eighty) calendar days from date of work order.

The Contractor agrees that in default of completing all work within the period of time stipulated above, to be bound in the amount of \$500.00 LIQUIDATED DAMAGES, not as a penalty, for each calendar day beyond the stipulated time.

Said proposal, specifications and plans are identified herewith, and made part hereof, after being paraphrased "NE VARIETUR", by the Notary for identification herewith.

B O N D

And now to these presents, personally came and intervened

who declared that he has read and taken cognizance of the above and foregoing contract between the Board of Levee Commissioners of the Orleans Levee District and _____, Contractor, and binds said company in solido with the said Contractor unto the Board of Levee Commissioners of the Orleans Levee District, in the sum of:

as security for the faithful and satisfactory performance by the said _____, Contractor, of all clauses and conditions of this contract and for the payment by the Contractor or subcontractor for all work done, labor performed, or material or supplies furnished for the construction, alteration, or repair under this contract, or for transportation and delivery of such materials or supplies to the site of the job by a for hire carrier, or for furnishing materials or supplies for use in machines used in the construction, alteration, or repair under this contract, in accordance with the law, the condition of this obligation being that if the said _____, Contractor, shall well, truly and faithfully and satisfactorily perform all of the obligations assumed by _____, Contractor, under this Contract and payment be made by said Contractor and by all Subcontractors for all work done, labor performed and material furnished under this Contract in accordance with law, then this Bond shall become null and void, otherwise to remain in full force and effect.

The said Surety consents and yield to the jurisdiction of the Civil District Court for the Parish of Orleans, State of Louisiana, and formally waived any plea of jurisdiction on account of residence elsewhere in the event of suit under the Contract and Bonds, and the Surety herein shall be limited to such defense only as the principal of these bonds could make.

O.L.B. CONTRACT NO. 2042-0344

THUS DONE AND PASSED, in my office at the City of New Orleans,
on the day, month and year hereinfirst above written, in the presence of

_____ and _____
competent witnesses, who hereunto sign their names with said appearers
and me, Notary, after reading of the whole.

THE BOARD OF LEVEE COMMISSIONERS
OF THE ORLEANS LEVEE DISTRICT

WITNESSES:

By _____

By _____

Attorney-in-Fact Bonding

NOTARY PUBLIC

AFFIDAVIT FORM

STATE OF LOUISIANA)
)
PARISH OF _____)

AFFIDAVIT ATTESTING THAT PUBLIC CONTRACT WAS NOT,
NOR WILL BE SECURED THROUGH EMPLOYMENT OR
PAYMENT OF SOLICITOR

KNOW ALL MEN BY THESE PRESENTS, that a public contract is contemplated between The Board of Levee Commissioners of the Orleans Levee District and _____, represented by _____, (Name) (Title)

who attests that he is empowered and authorized to execute said documents.

FURTHER, _____,

who being duly sworn, does depose and attest that:

(1) affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction of the public building or project, or in securing the public contract were in the regular course of their duties for affiant; and

(2) no part of the contract price received by affiant was paid or will be paid to any person, corporation firm, association, or other organization for soliciting the contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction of the public

building or project were in the regular course of their duties for
affiant.

WITNESSES:

BEFORE ME, the undersigned authority, personally appeared
_____, who being duly sworn, deposes and
states that the above is true and correct in all respects recited.

SWORN TO AND SUBSCRIBED before me, this _____ day
of _____.

NOTARY PUBLIC

Federal Identification No.

PREVAILING WAGE DECISION

NO. 12834

<p>LOUISIANA DEPARTMENT OF LABOR PREVAILING WAGE RATE DIVISION</p>	<p>REQUEST FOR WAGE DETERMINATION AND RESPONSE TO REQUEST AS AMENDED</p>	<p>R.S. 38:2301 (Act 65) and Related Statutes</p>
<p>Requesting Officer (Typed Name) Mr. James B. Lane, P.E.</p>		
<p>Requesting Agency or Architectural Firm Waldemar S. Nelson and Co., Inc.</p>		
<p>Telephone (504) 523-5281</p>		
<p>Date of Request 11-20-85</p>	<p>Estimated Advertising Date</p>	<p>Estimated Bid Opening Date</p>
<p>Prior Decision Number (If Any)</p>	<p>Estimated Value of Contract</p>	<p>Type of Construction <input type="checkbox"/> BUILDING <input type="checkbox"/> SHIPBUILDING & REPAIR <input type="checkbox"/> MARINE DRED. <input type="checkbox"/> HIGHWAY <input checked="" type="checkbox"/> HEAVY <input type="checkbox"/> WATER WELL <input type="checkbox"/> DRILLING </p>
<p>Location of Project Seabrook Floodwall Extension</p>		
<p>Decision Number LDL# 12834</p>	<p>Parish Orleans</p>	<p>State Louisiana</p>
<p>Effective Date 11-20-85</p>	<p>Address to Which Wage Determination Will Be Mailed Mr. James B. Lane, P.E. 1200 St. Charles Ave. New Orleans, LA 70130</p>	
<p>Expiration Date 2-20-86</p>		
<p>Supersedes Decision Number</p>		
<p>APPROVED BY: <i>Johnny L. Hodges</i> JOHNNY L. HODGES ASSISTANT SECRETARY OF LABOR OFFICE OF LABOR</p>	<p>Description of Project Orleans Levee District Job #2042-0206 and WSNCo. Job #85063. Excavation, Embankment, Pile Driving, Reinforced Concrete Floodwalls, Steel Floodgates, Utilities Construction and Relocation including Sewer Services Lines, Water Mains and Gas Lines, Relocation of Overhead Electrical Lines.</p>	<p>PROJECT NO.:</p>

SECTION I: Wage Rate Decisions

- Rule 1: Work projects will be categorized under one of the following types of work:
- A. Building Construction
 - B. Highway Construction
 - C. Heavy Construction
 - D. Shipbuilding
 - E. Marine floating bucket or hydraulic dredging
 - F. Water well drilling
- Rule 2: Geographic boundaries shall be established for each craft by the Assistant Secretary of Labor.
- Rule 3: Every prevailing wage rate decision issued will list a minimum hourly wage rate and related fringe benefits for each classification of worker which may be expected to be utilized in the completion of the contracted project.
- Rule 4: Every prevailing wage rate decision issued will include a copy of these Prevailing Wage Rate rules in the form in which they are finally adopted.
- Rule 5: There may be issued such modifications or addendums to prevailing wage rate decisions as the Assistant Secretary determines is necessary to update wage rate data or to include additional job classifications.
- Rule 6: Decisions will include definitions of such workers classifications as the Assistant Secretary deems necessary. Additional definitions or clarification of job functions for workers classifications may be obtained upon submission of a request to the Assistant Secretary.
- Rule 7: Workers who perform job functions of a classification other than the classification in which they are listed shall be paid not less than the minimum wages issued for the classification in which they actually work.
- Rule 8: Apprentices indentured in an apprenticeship program approved by the Louisiana Office of Labor and who are performing job functions of the craft into which they are indentured shall be paid at the rate of pay resulting when the percentage points for the apprentices' current progression step is applied to the wage rate issued for the classification in which they are working.
- Rule 9: All workers, except those apprentices described in Rule 8 above, who perform work directly on the job site must be paid not less than the minimum wages issued for the classification in which they work.
- Rule 10: The contracting agency shall notify the Assistant Secretary for the Office of Labor of the successful bidder for the project and the date, time, and place of the prejob conference, which notice shall include an invitation to the Assistant Secretary or his designee to attend for the purpose of explaining the contractor's responsibilities under the prevailing wage law.
- Rule 11: It shall be the responsibility of the general contractor on the first day the job commences to post the entire prevailing wage rate decision including these rules in a prominent and easily accessible place at the site of the work. It shall also be the responsibility of the general contractor to furnish a copy of the prevailing wage rate decision for the project and a copy of the prevailing wage rate rules to each subcontractor involved in the project and to explain to the subcontractor his responsibilities with respect to R.S. 38:2301 and the contract for the applicable project.

SECTION II: Enforcement

- Rule 1: Field personnel of the Office of Labor will conduct inspection as assigned by the Assistant Secretary as well as routine inspections of the work projects for which a prevailing wage rate decision has been issued.
- Rule 2: On each inspection the Office of Labor's representative shall first ascertain whether the prevailing wage rate decision is posted. He or she may then witness the work being performed, conduct interviews with/or take written statements from management personnel and/or workers on the job site or what other investigative techniques he or she may deem to be appropriate in order to determine whether or not the workers are being paid in compliance with the terms of the prevailing wage rate decision.
- Rule 3: The Assistant Secretary or his designee, in order to ensure compliance and enforcement of a prevailing wage decision, may at any time during a project inspect the books and records of any contractor or subcontractor. The Assistant Secretary may initiate such inspection upon his own motion or after his receipt of an oral or written complaint from an employee on the project. The inspection of the books and records may take place at the jobsite or such other reasonable location specified by the Assistant Secretary or his designee, including but not limited to the office of the Assistant Secretary.
- Rule 4: The failure of a contractor or subcontractor to timely furnish the books and records requested by the Assistant Secretary or his designee or the furnishing of false or misleading information shall be deemed to be sufficient cause to preclude the waiver of the applicable penalty.
- Rule 5: Workers employed on a project for which a prevailing wage rate decision has been issued who suspect that they are not being paid in accordance with the schedule of wages listed in the decision should contact:
- Louisiana Department of Labor
Prevailing Wage Division
5360 Florida Boulevard
Baton Rouge, Louisiana 70806
Telephone (504) 925-4224
- Rule 6: The names of all complainants shall remain strictly confidential whether such complaint is verbal or written.
- Rule 7: LSA - R.S. 23:964 reads as follows:
- "***Any employer who discharges, or in any other manner discriminates against any employee because such employee has testified in any investigation or proceeding relative to enforcement of any of the labor laws of the State of Louisiana, shall be fined not less than one hundred dollars nor more than two hundred fifty dollars, or imprisoned for not less than thirty days nor more than ninety days or both."
- Any employer who violates the provisions of the above-quoted statute shall be reported to the District Attorney for the parish in which the offence occurred. The District Attorney shall be supplied with any and all supportive evidence of the violation and a request from the Assistant Secretary of Labor that the employer be prosecuted to the fullest extent of the law.
- Rule 8: These rules will abolish or supersede prevailing wage rules adopted on 11-20-80.

LOUISIANA DEPARTMENT OF LABOR/OFFICE OF LABOR

PREVAILING WAGE RATE DIVISION

III. HEAVY CONSTRUCTIONPAGE 3 OF 4 DECISION NO. LDL 12834

- A. Mechanic* Defined as an employee using the tools of a skilled trade or craft in the performance of his/her work.

PARISH: ORLEANS

CLASSIFICATION	BASIC HOURLY RATES	FRINGE BENEFITS
AIR CONDITIONING/REFRIGERATION MECHANIC	16.80	2.43
BOILERMAKERS	16.125	2.95
BRICKLAYERS/STONEMASONS	14.50	2.04
CARPENTER/PILEDRIVERMEN	14.31	2.60
CEMENT MASONS	13.22	1.68
<u>ELECTRICIANS</u>	16.15	3.13
CABLE SPLICERS	16.15	3.13
IRONWORKERS	14.54	2.43
LABORERS	9.57	1.08
LINE CONSTRUCTORS:		
<u>GROUP 1 - LINEMEN</u>	12.10	1.70
<u>GROUP 2 - GROUND MEN</u>	5.85	1.47
<u>GROUP 3 - WINCH TRUCK OPERATOR AND TRACTOR DRIVER</u>	8.72	1.58
<u>GROUP 4 - HOLE DIGGER OPERATOR</u>	10.47	1.64
PAINTERS:		
<u>GROUP 1 - JOURNEYMEN</u>	13.235	2.115
<u>GROUP 2 - SPRAY</u>	13.61	2.115
<u>GROUP 3 - INDUSTRIAL</u>	15.535	2.115
PLUMBERS/PIPEFITTERS	16.80	2.43

LOUISIANA DEPARTMENT OF LABOR/OFFICE OF LABOR

PREVAILING WAGE RATE DIVISION

III. HEAVY CONSTRUCTION

PAGE 4 OF 4 DECISION NO. LDL 12834

A. Mechanic* Defined as an employee using the tools of a skilled trade or craft in the performance of his/her work.

PARISH: ORLEANS

CLASSIFICATION	CODES	BASIC HOURLY RATES	FRINGE BENEFITS
POWER EQUIPMENT OPERATORS:			
<u>GROUP 1:</u> OPERATING ENGINEERS		14.31	2.50
<u>GROUP 2:</u> 60 TON CRANE & OVER		14.56	2.50
<u>GROUP 3:</u> CRANE WITH 125 FOOT BOOM		14.56	2.50
<u>GROUP 4:</u> CRANE WITH 175 FOOT BOOM		14.81	2.50
<u>GROUP 5:</u> JUNIOR ENGINEER		10.73	2.50
<u>GROUP 6:</u> OILER		9.82	2.50
SHEETMETAL WORKERS		15.47	3.49
TEAMSTERS		9.82	1.20

WELDERS*

WELDERS RECEIVE RATES PRESCRIBED FOR CRAFT PERFORMING OPERATION TO WHICH WELDING IS INCIDENTAL.

SECTION 1

GENERAL SPECIFICATIONS

SECTION 1

GENERAL SPECIFICATIONS

1.01 FORM OF PROPOSAL

The proposal form is bound with the specifications together with the Bond Form, and all are an integral part of each proposal, and must be returned so attached, sealed in an envelope, marked, "BID", and further identified by the project name, as indicated on advertisement, to the Board's Office, Suite 202, Administration Building, New Orleans Lakefront Airport, New Orleans, Louisiana 70126, prior to the time specified in the advertisement for bids.

1.02 DEPOSITS

Each proposal must be accompanied by cash, bid bond, or certified check, of five percent (5%) of the amount bid, payable to the Board of Levee Commissioners of the Orleans Levee District, as a guarantee that the Bidder will, if awarded the contract, enter into a Notarial Contract with the Board of Levee Commissioners of the Orleans Levee District. Deposit will be returned to all unsuccessful bidders upon adjudication of the contract, included under these specifications, and to the successful bidder when contract is signed, bond furnished, and work started in accordance with proposal and specifications. Should the successful bidder fail to furnish Bond, as required, or to start work as per his proposal, the deposit of that bidder shall be forfeited to the Board of Levee Commissioners of the Orleans Levee District, as ascertained, admitted and liquidated damages.

1.03 ACCEPTANCE AND REJECTION OF BIDS

The Board of Levee Commissioners of the Orleans Levee District reserves the right to accept any, or reject any, and/or all bids, and to waive informalities, and to base acceptance of bids on responsibility and past performance of Contractors as well as on price bid.

1.04 NOTARIAL CONTRACT

The Board of Levee Commissioners of the Orleans Levee District, as party of the first part, hereinafter referred to as "The Board", or the "Orleans Levee Board", will require that the bidder to whom the award has been made, as party of the second part, hereinafter referred to as "The Contractor", enter into a Notarial Contract within forty-eight (48) hours after receipt of notification from the Board that award of contract has been made to him. The fee of the Notary, who will be selected by the Board, will be paid by the Contractor. See 1.42 for fee schedule. The recording or fees likewise to be paid by the Contractor.

1.05 BOND

The Contractor shall furnish, without expense to the Board, a bond written by a Bonding Company, to be approved by the Board, in the total amount of Contract. This is to guarantee to the Board the proper performance by the Contractor of all and singular obligations assumed by said Contractor under this contract. This bond will be cancelled and sureties released after completion and acceptance by the Board of the work described herein, and after expiration of the period provided by law.

1.06 DEFINITION OF TERMS

Wherever the term, "Chief Engineer," is used in these specifications, drawings, and in the contract, it shall mean the Chief Engineer of the Board of Levee Commissioners of the Orleans Levee District. Wherever the word, "Board," or "Orleans Levee Board," is used it shall mean the Board of Levee Commissioners of the Orleans Levee District.

1.07 GENERAL AND SPECIAL SPECIFICATIONS

Wherever the word, "Specifications", is mentioned in the proposal, contract or elsewhere, it shall be taken as meaning both the General and the Special Specifications.

1.08 SPECIFICATIONS AND DRAWINGS

The specifications and drawings accompanying the proposal are deemed sufficient for the proper execution of the work contemplated under this contract, but should there be an omission or error, or should the said drawings and specifications be insufficient, the Contractor shall not be permitted to profit thereby, nor shall he be penalized, but the Chief Engineer shall, upon discovery of insufficient drawings and specifications, error or omission, correct same, or supply the necessary information or correction.

1.09 INTERPRETATION OF DOCUMENTS

No oral interpretation will be made to any bidder as to the meaning of any of the Contract Documents which in effect would modify any of the provisions of same. Every request for an interpretation of the Documents shall be made in writing and delivered to the Chief Engineer, at least, seventy-two (72) hours before the time fixed for opening of bids. Every interpretation shall be in the form of an Addendum to the specifications. All Addenda issued shall become part of the Contract Documents.

1.10 EXTRA WORK

If any work, not included in this contract and not specified herein, or called for on the plans, is deemed necessary by the Chief Engineer,

1.10 (Continued)

it shall be performed by the Contractor as Extra Work. No claim for Extras will be allowed unless specifically authorized in writing by the Chief Engineer of this Board. Payment for such Extra Work shall be made on the basis of a price previously agreed on, if this is feasible, otherwise at actual cost to the Contractor for all labor and material used, plus fifteen percent (15%). No compensation will be allowed for overhead, or for the rental of small tools. If any equipment, such as, pile drivers, pumps, excavations, air compressor, and such machinery is used in doing extra work, payment for the rental of such machinery will be made at a price to be agreed on between the Contractor and the Chief Engineer before any work is undertaken.

1.11 INSURANCE

Before the Contract may be signed, the Contractor must have his Insurance Carrier submit to the Board properly completed Insurance Certificates for acceptance and evidencing coverage in the following limits:

(a) Workmen's Compensation and Employer's Liability

Statutory Workmen's Compensation. Employer's Liability coverage, in the limit of \$100,000.00 each accident. In the event this Contract involves work on, or adjacent to, navigable streams or bays, Contractor's Certificate shall show coverage in compliance with the provisions of the Federal Longshoreman's and Harbor Workers' Compensation Laws. If any Watercraft and/or Amphibian is used for work under this contract, coverage must be provided for Employer Maritime Liability (including, but not limited to the Jones Act and the Voluntary Compensation Endorsement) for the limits of \$100,000.00 One Employee, and a Total Limit of \$300,000.00 for Two or More Employees.

(b) Comprehensive General Liability

- (1) Coverage shall be on an Occurrence Basis
- (2) Bodily Injury Limits shall be not less than \$500,000.00 per occurrence.
- (3) Property Damage limits shall be not less than \$100,000.00 per Occurrence and \$500,000.00 Aggregate. Property Damage shall include Coverage for Crafts or Trades which are subject to normal policy exclusions of:
 - (a) Blasting or explosion
 - (b) Collapse
 - (c) Damage to underground property (wires, conduits, and the like) and injury to, or destruction of any property resulting therefrom.

1.11 (Continued)

- (4) Coverage shall include Completed Operation and Products, along with Contractual Liability.

(c) Comprehensive Automobile Liability

- (1) Bodily Injury limits \$100,000.00 each Person \$500,000.00 each occurrence.
- (2) Property Damage Liability limits shall be not less than \$100,000.00 each occurrence.
- (3) Coverage shall include:
 - (a) Owned Vehicles
 - (b) Hired or Leased Vehicles
 - (c) Non-owned Vehicles

(d) Owners and Engineers Protective (Contingent) Liability

- (1) This shall be in the name of, and for protection of, the Owner and the Engineer
- (2) Bodily Injury Limits shall be not less than \$500,000.00 per occurrence
- (3) Property Damage Limits shall be not less than \$100,000.00 per occurrence and \$500,000.00 Aggregate.

(e) Aviation Liability Insurance (applicable if aircrafts are used in operations)

- (1) Bodily Injury Limits shall be not less than \$100,000.00 per person and \$500,000.00 per accident, excluding passenger hazard.
- (2) Passenger hazard Bodily Injury Limits shall be not less than \$100,000.00 per aircraft seat.
- (3) Property Damage Limits shall be not less than \$100,000.00 per accident.
- (4) Coverage shall include all leased, hired or other non-owned aircraft.

(f) Marine Insurance (applicable if Watercraft and/or Amphibians are used in operations)

- (1) Protection and Indemnity Insurance on all vessels owned and/or chartered with Limit of Liability up to value of vessel or \$500,000.00 single limit whichever is greater.

(continued)

(g) Hold-Harmless Agreement

The Contractor shall indemnify, and hold and save harmless the Board from all loss, liability or expense to which the Board may be subjected as a result of the operations, acts or omissions of the Contractor, or any Subcontractor, and the Contractor shall effect and maintain an Insurance Policy with a contractual endorsement to insure the Board's protection, as to its own property and the property of third parties under the foregoing indemnity, and hold harmless agreement with property damage limits of not less than one hundred thousand dollars (\$100,000.00), for the properties of the Board, or any other single property owner; and three hundred thousand dollars (\$300,000.00) for the properties of the Board and all other property owners.

This insurance shall be placed with reliable insurance carriers satisfactory to the Board, with a Best Rating of B-X or better, who are authorized to do business in the State of Louisiana.

All certificates of insurance shall include thirty (30) days notice of cancellation.

1.12 ENGINEER'S DECISION FINAL

If any of the clauses of these specifications appear to conflict, or to be inconsistent, they will not be read separately, but all of the clauses shall be understood to be cumulative, and the specifications as a whole be read, in order to arrive at the intent of the Contract.

The Chief Engineer shall be the sole judge of the meaning and intent of these specifications, and to whether the specifications have been fully complied with, and the contract satisfactorily performed, and his decision, in case of any misunderstanding or dispute in these particulars, shall be final and binding on both parties.

1.13 ANNULMENT OF CONTRACT

If, in the opinion of the Chief Engineer, the Contractor fails to perform the work with sufficient workmen and equipment, or with sufficient material to insure its completion in the time specified in the contract, or shall discontinue the prosecution of the work, or become insolvent, or bankrupt, or shall not carry out the work in an acceptable manner, the Chief Engineer shall give notice in writing to the Contractor, or his Surety, of such delay, neglect, or default, specifying same, and if the Contractor, within a period of ten (10) days after such notice shall not proceed in accordance therewith, then the Chief Engineer shall have full power and authority without violating the contract, to take the prosecution of the work out of the hands of the Contractor, to appropriate or use any, and/or all materials and equipment on the grounds as may be suitable and acceptable, and may enter into an agreement for the completion of said contract, according to the terms and provisions thereof, or use such other methods, as in his opinion shall be required for the completion of said

1.13 (Continued)

contract, in an acceptable manner, and within the time specified. All costs and charges incurred by the Board of Levee Commissioners of the Orleans Levee District, together with the cost of completing the work under contract, shall be deducted from any monies due, or which may become due said Contractor. In case the expense incurred by the Board of Levee Commissioners of the Orleans Levee District shall be less than the sum which would have been payable under the contract, had it been completed by said Contractor, the said Contractor shall be entitled to receive the difference; and in case such expense shall exceed the sum which would have been payable under the contract, then the Contractor and his Surety shall be liable to the Board of Levee Commissioners of the Orleans Levee District for the amount of said excess.

1.14 ORDINANCES

The Contractor shall comply with all Federal, State, and City laws, as well as Police and Health Ordinances applying to public work.

1.15 SUBCONTRACTORS

No part of the work herein contracted for shall be given, sold or assigned to Subcontractors without the consent of the Chief Engineer of this Board.

1.16 SUPERINTENDENT

The Contractor must, at all times, either be personally present around the work, or be represented by a competent Superintendent, who shall be clothed with full authority to act for him in all cases, and to carry out any instructions relative to the work, which may be given by the Chief Engineer, either personally, or by his authorized representative. The Superintendent shall have had the required experience in this class of work, and he shall be satisfactory to the Chief Engineer of the Board.

1.17 PATENTS

The Contractor shall defend any and all suits instituted for alleged infringement of patents, if any, or all of the material, or apparatus furnished, or used under these specifications and drawings, or for any other materials or apparatus not specifically mentioned therein, and shall pay all damages and cost of suits instituted in any court, provided that the Board of Levee Commissioners of the Orleans Levee District shall give the Contractor notice and opportunity to defend such suit or suits.

1.18 LIGHTS

The Contractor shall keep proper lights each night between the hours of sunset and sunrise upon all equipment connected with the work when necessary, and shall be responsible for all damages resulting from any neglect or failure in this respect.

1.19 INSPECTION

The work will be conducted under the general direction of the Chief Engineer, and will be inspected by Inspectors appointed by him, who will enforce a strict compliance with the terms of the contract.

The Inspector will keep all necessary records of the work that has been done, but the presence of the Inspector shall not relieve the Contractor, or his Agents, from any responsibility for the proper performance of the work.

The Contractor shall not be entitled to payment for any improper work accepted or allowed by the Inspector.

1.20 PROSECUTION OF WORK

The work shall be prosecuted as directed by the Chief Engineer, and shall be conducted in such manner and with sufficient materials, equipment and labor, as will insure the completion of the work within the time specified in the written proposal of the Contractor.

1.21 MOVEMENT OF PLANT

At no time shall the plant of the Contractor, or any part thereof, be removed from the site of the work, without the consent in writing from the Chief Engineer.

1.22 ORDER OF WORK

The Chief Engineer shall have the right to designate the place at which work shall begin, and the Contractor will be required in advance of the moving of the work, to obtain the approval of the Chief Engineer as to the plan of operations he contemplates following.

1.23 LIENS AGAINST CONTRACTORS

Whenever required, the Contractor shall show evidence satisfactory to the Chief Engineer, that all bills for labor, materials, supplies, salaries, and equipment have been paid by the Contractor, and that there are no liens or claims against the Contractor, by furnishing a lien certificate from the Recorder of Mortgages for work or materials furnished in the performance of this work.

1.24 PARTIAL PAYMENTS

Partial payments will be made on monthly estimates of work done and accepted by the Chief Engineer as being completed, according to plans and specifications, reserving ten percent (10%) of the amount earned in each estimate.

The ten percent (10%) retainer on each payment will not be released by the Board until the expiration of the time prescribed by law.

The Contractor shall use Orleans Levee Board forms for "Periodical Estimate for Partial Contract Payment", in submitting request for partial payments. These forms are to be submitted to the Board in original and three copies for a total of (4). Forms may be obtained at the office of the Orleans Levee Board as required.

The Contractor must submit his Lien & Privilege Certificate with his final request for payment, in order to receive his ten percent (10%) Retainer. This Lien & Privilege Certificate is obtained from the Mortgage Office forty-five (45) days after Certificate of Acceptance has been recorded.

1.25 TIME TO FILE CLAIMS

The monthly estimate of work accomplished shall cover all monies due the Contractor, but if the Contractor, at any time, shall feel that he has claim for work not allowed in the estimate, then, he shall file this claim within thirty (30) days after receipt of the monthly estimate of work to which the claim applies.

Any claim filed later than thirty (30) days after receipt of the monthly estimate to which it applies shall not be considered; and the filing of any claim within the aforesaid time is a condition precedent to the consideration of the claim.

1.26 BOARD OF ARBITRATORS

Upon the final settlement of this contract all disputed matters, which have occurred in the course of said contract, and which have not been disposed of, as provided for in Paragraph 1.12, shall be submitted to a Board of Arbitrators; one member shall be selected by the Board, one member by the Contractor, and the third member shall be selected by the former two members, who shall grant a prompt hearing and decision on all disputed matters. Said decisions shall be final and binding on both parties. The cost for the services of the third member, if any, to be borne jointly between the Contractor and the Board.

1.27 CLEANING UP

At the completion of contract, and before final acceptance, the Contractor shall move his equipment, including the discarded equipment, if any, the temporary structures used by him during construction, all debris and rubbish, and leave the site in clean condition, to the satisfaction of the Chief Engineer.

1.28 ACCEPTANCE

Upon completion of the work shown on the plans and described in these specifications, the work performed shall be inspected as a whole, and if found satisfactory by the Chief Engineer, a Certificate of Acceptance, with the final estimate shall be issued, but no acceptance of the work, for final payment shall be made unless and until said Certificate of Acceptance is issued by the Chief Engineer.

1.29 CERTIFICATE OF ACCEPTANCE

Upon acceptance of the Contract, the Board will file the Acceptance with the Recorder of Mortgages, as the Contractor's retainage will be held for forty-five (45) days after date of filing, as required by law.

1.30 OFFICE OF CONTRACTOR

The Contractor shall maintain on the site of the work a field office, and he shall agree that all communications, orders, or instructions delivered to his field office from the office of the Board shall be received and shall have the same legal force and effect as if delivered to him in person.

1.31 WITHDRAWAL OF BIDS

No bids may be withdrawn after the scheduled closing time for receipt of bids, nor for at least THIRTY (30) DAYS thereafter.

1.32 TAXES

The prices stated in the proposal shall include all taxes applicable to the Board of Levee Commissioners of the Orleans Levee District.

1.33 AWARD OF CONTRACT

Unless otherwise specifically stated in the Special Specifications the contract will be awarded on bid prices in the proposal. If time is bid by the Contractor all bids will be corrected in accordance with the Liquidated Damage Paragraph of the proposal, otherwise no correction is necessary if the Board establishes the time of the Contract.

1.34 CONTRACT BE LET AS WHOLE

Unless otherwise specifically stated in the Special Specifications, the contract will be let as whole. No bid will be considered in which all items have not been priced by the bidder.

1.35 ADDENDUM

All bidders are requested to direct all questions about the specifications promptly to the Chief Engineer. This will facilitate making Addendum as required.

1.36 APPROXIMATE QUANTITIES

Unless otherwise specifically specified in the Special Specifications, all quantities mentioned in the proposal are approximate and for bidding purposes only.

1.37 REFERENCE TO MATERIALS BY NAME

Specific reference in the specifications to any product or material by name, or make, shall be interpreted as established a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option, use any product or material, which in the judgement of the Chief Engineer is equal to that named. Prior to the submission of proposal, any proposed substitution of material must be submitted to the Chief Engineer in writing for approval.

1.38 DIFFICULTIES

Attention of bidders is called to the conditions and difficulties that may be encountered in his work, and bidders are warned to visit and inspect the site of work, and acquaint themselves thoroughly with conditions, especially weather, etc., as the Board assumes no responsibility whatever for information furnished the Contractor, and does not guarantee its correctness, but the Contractor shall assume full responsibility for his equipment, as no claim will be entertained in the case of loss due to any cause whatsoever.

1.39 LIQUIDATED DAMAGES

The Contractor specifically agrees in his proposal to the amount of time in which this contract is to be completed, calculated from the date of issuance of Work Order to the date of its completion and acceptance by the Chief Engineer. Anytime that is consumed for the completion over and above the stipulated amount of time, agreed to in the proposal by the Contractor, shall be charged against the Contractor as Liquidated Damages, not as a Penalty. The contractor's failure to complete the work on time shall be a default, notice of which is waived by the Contractor.

1.40 CONTRACT TIME

The Contract time shall consist of the calendar days elapsed, beginning with the date of issuance of Work Order and ending with the completion of the work and acceptance by the Chief Engineer. If in the opinion of the Chief Engineer the Contractor's work should be delayed because of rain, a strike, or an act of God, such as a hurricane, fire, etc., he shall be granted an extension of time. If the Contractor has worked on any part of the project for at least four (4) hours on any one day, he will have no claim for extra time on that day.

Any request for extension of Contract time shall be submitted in writing by the Contractor to the Chief Engineer and shall state the reason for request.

1.41 LICENSES

In accordance with State Act No. 233, effective August 1, 1956, and amended to date, on projects amounting to more than \$50,000.00 only bids of Contractors and/or Subcontractors licensed under Act No. 233 of 1956 and amended to date will be considered.

It is the responsibility of the bidder to determine the proper job classification and to possess the proper license, all in accordance with LRS 37:2151 et seq.

Contractors desiring to bid shall submit to Architects or Engineers evidence that they hold license of proper classification and in full force and effect.

1.42 ATTORNEY AND NOTARY FEE SCHEDULE:

		<u>FEE</u>		<u>COSTS*</u>		<u>TOTAL</u>
UNDER	\$	3,000	\$	125.00 +	\$	75.00 = \$ 200.00
"	\$	6,000	\$	180.00 +	\$	75.00 = \$ 255.00
"	\$	10,000	\$	230.00 +	\$	75.00 = \$ 305.00
"	\$	15,000	\$	275.00 +	\$	75.00 = \$ 350.00
"	\$	25,000	\$	375.00 +	\$	75.00 = \$ 450.00
"	\$	50,000	\$	500.00 +	\$	75.00 = \$ 575.00
"	\$	100,000	\$	650.00 +	\$	75.00 = \$ 725.00
"	\$	250,000	\$	900.00 +	\$	75.00 = \$ 975.00
"	\$	500,000	\$	1,100.00 +	\$	75.00 = \$ 1,175.00
"	\$	1,000,000	\$	1,800.00 +	\$	75.00 = \$ 1,875.00
"	\$	5,000,000	\$	3,800.00 +	\$	75.00 = \$ 3,875.00
"	\$	15,000,000	\$	5,900.00 +	\$	75.00 = \$ 5,975.00
OVER	\$	15,000,000	\$	6,500.00 +	\$	75.00 = \$ 6,575.00

*Includes costs of recording contract plus notarizing and recordation of Affidavit of Acceptance.

1.43 LABOR RATES AND PRACTICES

(a) WAGE RATES

Minimum wages to be paid the various classes of laborers and mechanics employed on this work, shall be based upon the wages determined by the Secretary of the U. S. Department of Labor to be the prevailing wage for the corresponding classes of laborers and mechanics employed on the projects of similar character in the New Orleans area. The scale of wages to be paid shall be posted by the contractor in a conspicuous place at the site of work.

(b) CONTRACT WORK HOURS

No laborer or mechanic shall be required or permitted to be employed in this work in excess of eight (8) hours in any Calendar Day, or in excess of forty (40) hours in any work week, unless such laborer or mechanic receives compensation at a rate not less than one and one-half (1-1/2) times his basic rate of pay for all hours worked in excess of eight (8) hours in any Calendar Day, or in excess of forty (40) hours in such work, week, whichever is the greatest number of overtime hours.

(c) PAYMENT OF EMPLOYEES

All employees engaged in this work shall be paid in full, (less deductions made mandatory by law), not less often than once each week, without subsequent deductions, rebate on any account the full amount due at time of payment computed in accordance with the provisions of (a) and (b) above, irrespective of any contractual relationship which may be alleged to exist between the Contractor and/or Subcontractor, and such laborers and mechanics.

1.44 AUDIT AND INSPECTION

The Owner's authorized representatives and/or the Louisiana State Legislative Auditor shall be entitled and permitted to inspect all work, material, records of personnel, invoices of materials, other data and all other records that pertain to the execution of this contract.

1.45 SIGNING OF PROPOSAL DOCUMENTS

Any proposal documents not signed by the Contractor will not be accepted by the Board. If the proposal is made by a partnership, it shall contain the names of each partner and shall be signed in the firm name, followed by the signature of the person authorized to sign. If the proposal is made by a corporation, it shall be signed by the name of the corporation, followed by the signature of the officer authorized to sign, and the printed designation of the office he holds in the corporation. Contractor is reminded that he must fill out the bidder information form and the bidder experience form, otherwise the proposal may be considered informal and could be rejected. Contract form, bond form and affidavit form are not to be filled in by bidder.

1.46 PAYMENT OF PREVAILING WAGES

(a) It is hereby declared to be the public policy of the State of Louisiana that projects of maintenance, construction or other public works contracts to be performed on state owned properties or to be state-financed in whole or in part, but to be performed by private contractors, should be a model of fair treatment by employers of employees and should represent a source of employment for our citizens at fair and reasonable wages; that successful competitive bidders or contractors otherwise selected by the state or its agencies should not pay their employees on these state projects wages below the standards prevailing for similar work in the area, thus further depressing the local economy rather than stimulating it; that the quality and proficiency of the work on public contracts are adversely affected by payment of wages below the standards prevailing for the same or similar work in the area; that the payment of prevailing wage scales by contractors on such public works projects is a matter affecting the health, safety and welfare of residents of the State of Louisiana; and that no bidder who does not comply with the requirements of this section shall be considered a responsible bidder within the meaning of Louisiana law.

(b) Specifications for every contract in excess of twenty-five thousand dollars, where at least 90% of the total funds involved are state or federal funds, to which the State of Louisiana or any state agency, department or board and a private contractor are parties, for construction, alteration and/or repair, including painting and decorating of public buildings or public works of the State of Louisiana or any of its agencies, departments or boards and which require or involve the employment of workmen, mechanics and/or laborers, shall contain a provision stating the minimum wages to be paid various classes of workmen, be determined by the commissioner of labor of the State of Louisiana to be prevailing in the area for corresponding classes of workmen, laborers and mechanics employed on projects of a character similar to the contract shall have such specifications as a part of it whether required by law to be advertised or not.

(c) Every contract based upon such specification shall contain a stipulation that the contractor or his sub-contractor shall pay, at the time and at the place established by existing law or custom all workmen, mechanics and laborers who have performed work under the contract, and without subsequent deduction or rebate on any account, the full amount accrued at the time of payment, less any authorized deductions for wage assignments, garnishments, taxes, insurance premiums or other similar lawful deductions computed at wage rates not less than those stated in the specifications, regardless of any contractual relationship or agreement to the contrary which may be alleged to exist between the contractor or sub-contractor and such workmen, laborers, or mechanics.

(d) The minimum scale of wages to be paid shall be posted by the contractor in a prominent and easily accessible place at the site of the work.

(e) Every contract subject to the provisions of this section shall contain the stipulation that there may be withheld from the contractor so much of accrued payments as may be necessary to pay to workmen, laborers and mechanics employed

by the contractor or any sub-contractor on the work the difference between the rates of wages required by the contract to be paid to such laborers, workmen and mechanics and the rate of wages received by such workmen, laborers, and mechanics.

(f) Every contract within the scope of this section shall contain the further provision that in the event it is found by the commissioner of labor or the department, agency or board letting the contract that any laborer or mechanic employed by the contractor or any sub-contractor directly on the site of the work covered by the contract has been or is being paid a rate of wages less than the rate of wages required by the contract and this law, that the State of Louisiana or its department, agency or board letting the contract may, by written notice sent by registered or certified mail to the contractor, require him to pay to the said workman, laborer or mechanic the amount by which he has been underpaid plus as a penalty, twice that amount; provided, however, that the surety for such contractor shall not be liable for said penalty. If within ten days after receipt by the contractor of such written notice, the contractor shall demonstrate to the commissioner of labor that his failure to pay the prevailing wage as specified in the contract was due to clerical error or inadvertence, the commissioner of labor shall forgive the penalty herein authorized, provided the deficiency in wages is actually paid or tendered to the said workman, laborer or mechanic by the contractor within said ten day period. Within twenty days after receipt by the contractor of such written notice to pay said workman, laborer or mechanic, such underpayment and penalties the contractor may appeal, devolutively, said order by summary process and may rule the commissioner of labor to show cause in the Nineteenth Judicial District Court for the Parish of East Baton Rouge why such order should not be recalled and revoked. An appeal shall lie from the ruling of the Nineteenth Judicial District Court in said matter to the appellate courts as provided by existing laws and shall be devolutive only. The only ground for reversal of the order to pay said wages and penalties by any court shall be that the order was not based upon any substantial evidence. No appeal of said order shall have effect of suspending same.

(g) The state, or its department, agency or board, in charge of the particular contract, if no appeal is taken by the contractor from the order to pay, or during the pendency of any such appeal is authorized and directed to pay directly to workmen, laborers and mechanics from any accrued payments withheld under the terms of the contract any wages found to be due workmen, laborers and mechanics pursuant to this section. If no appeal from the order to pay is taken by the contractor within the twenty day period specified in the preceding section, the state, or its departments, agency or board in charge of the particular contract shall, at the expiration of the delay for taking an appeal, pay to the workmen, laborers and mechanics from any accrued payments withheld the penalties found to be due. However, if an appeal has been timely taken, said funds withheld as penalties shall be held in escrow pending said appeal to be paid to the said workmen, laborers and mechanics or the contractor in accordance with the final judgment of the court.

(h) The commissioner of labor is authorized and directed to distribute a list to all departments of the State of Louisiana giving the name of persons or firms found by him to have violated their obligations to employees and sub-contractors under this section and who have not, within the ten day period specified in Subsection F of this section, demonstrated to the commissioner of labor that said violation was due to clerical error or inadvertence and who have not paid or tendered the wages found to be due to said workmen within said ten day period, as provided in said Subsection F hereof. No contractor shall be placed on said list who shall demonstrate to the commissioner of labor that the contractual obligation to pay the prevailing wage was violated by a bonafide independent sub-contractor who under the terms of his written sub-contract was required to pay said prevailing wage, and that said violation was without knowledge or complicity on the part of the contractor, but this provision shall not relieve the contractor of his liability for wages or penalties due workmen by himself or a sub-contractor as elsewhere provided in this section. No contract shall be awarded to the persons or firms appearing on this list or to any firm, corporation, partnership or association in which said persons or firms have an interest, until one year has elapsed from the date of publication of the list containing the names of such persons or firms. Any person or firm aggrieved by the action of the commissioner in so listing his or its name may appeal therefrom suspensively by summary process and may rule the commissioner of labor to show cause in the Nineteenth Judicial District Court for the Parish of East Baton Rouge why such listing of him should not be recalled or revoked. The Nineteenth Judicial District Court shall hear said appeal by preference, in term time or vacation, and shall rule thereon within ten judicial days after said appeal is filed in said court. An appeal shall lie from the ruling of the Nineteenth Judicial District Court in said matter to the appellate courts as provided by existing laws but shall be devolutive only. The only ground for revoking or recalling said listing by any court shall be that said listing was not based upon any substantial evidence that the person so listed had failed to pay workmen, employees, or sub-contractors as required by this section. Even though a violation of this act has occurred, the Governor in his discretion may at any time direct the commissioner to remove any name from said list, which shall remove the disabilities which accompany the list; provided that in such case the governor's action shall have no effect upon the right of a workman, laborer, or mechanic to recover the wages and penalties which may be due to him.

(i) The commissioner of labor of the State of Louisiana shall determine the "prevailing wages" within the meaning of this section for all workmen, laborers and mechanics in the locality of the public work to be done and shall publish and post the same from time to time. He shall make a determination of prevailing wage within thirty days before the specifications are advertised or publicized and the contract must be signed within ninety days thereafter or he must make another determination to be utilized in the contract.

Any state department, board or agency directly concerned with any project upon which determination is made and that is not satisfied that the determination is fair and reasonable, and in accordance with the requirements of this section, for review of the commissioner's determination. The Governor shall decide the

matter within the ten days of receipt of the appeal. The determination shall remain effective pending any such appeal.

(j) In determining the said prevailing wage, the commissioner of labor shall consider: (1) wage scales fixed by union-management collective bargaining agreements in the area, (2) the prevailing wage determination made for the area by the Secretary of Labor of the United States under the provisions of Title 40, U. S. Code, Section 276a, the Davis-Bacon Act, (3) the wages actually paid various classes of workmen, laborers and mechanics employed on projects of work of similar character to the contract work in the same or similar area within the state, and (4) any other pertinent data or facts that he may deem relevant and proper to such determination.

(k) "Prevailing wage" includes any and all fringe benefits, such as payments for health and welfare, pensions, vacations, life insurance, apprenticeship programs or supplemental unemployment benefit programs that may be a part of union contracts for workmen, laborers and mechanics under collective bargaining agreements for the various trades within the area, or that may be paid by employers without a collective bargaining agreement. The commissioner shall list separately the hourly wage to be actually paid and the fringe benefits to be provided, and shall specify that in the case of employees working without provision for the payment of fringe benefits, the cost of those included as a part of the "prevailing wage" required to be paid shall be paid to the employees as part of the hourly wage paid.

(l) The commissioner of labor is empowered to adopt and promulgate such reasonable rules and regulations and to conduct such investigations as he deems necessary to ensure the enforcement of this section. Among other powers inherent in him under this section the commissioner may inspect all of the books and records of the contractor or sub-contractor but only to determine if the "prevailing wage" provisions contained herein have been complied with; and that such information obtained by the commissioner shall be strictly confidential.

(m) None of the provisions of this section shall apply to any governing authority of any municipality, parish or other local political subdivision or agency, or to any contract let by any state department or agency to be financed by at least ninety percent, of funds belonging to such local political subdivision or agency, unless the governing body thereof, by appropriate ordinance or resolution, require payment of prevailing wage determined by the commissioner of labor, or by itself or its agents, in all or any public works contracts let by the said local authority in the same manner with the same compliance and enforcement and procedures, powers and penalties as provided in this section. Acts 1968, No. 65, §§ 1-13.

1.47 ARITHMETIC DISCREPANCIES IN BID PRICE:

The following methods will be used to resolve any arithmetic discrepancies found on bid forms as submitted by bidders:

- 1) Obviously misplaced decimal points will be corrected.
- 2) In the event of a discrepancy between the unit price and the extended price, the unit price will govern.
- 3) Apparent errors in the extension of unit price will be corrected.
- 4) Apparent errors in the addition of lump sum and extended unit prices will be corrected.

1.48 SUBCONTRACTORS:

Prior to receiving a work order, the successful bidder must submit to the Chief Engineer a list of all proposed subcontractors for the project. The list shall show the name and address of each firm, the type of work to be performed, the estimated dollar value of the work and the minority status (if any) of the firm. See paragraph 1.49 for definition of a minority firm.

1.49 MINORITY BUSINESS PARTICIPATION:

It is the established policy of the Orleans Levee Board to encourage to the fullest extent the use of local minority contractors for subcontract work whenever practical. A list of certified minority owned construction firms in each specialized field of construction may be obtained from the Office of Minority Business Development, City of New Orleans. For purposes of these specifications, minority owned firms are defined as follows:

"Minority" shall mean a person who is a citizen or lawful permanent resident of the United States and who is:

- (a) Black: having origins in any of the black racial groups of Africa.
- (b) Hispanic: of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish or Portuguese culture or origin regardless of race.
- (c) Asian American: having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.

(d) American Indian or Alaskan Native: having origins in any of the original peoples of North America.

(e) Female.

"Minority business enterprise" or "minority-owned business" means a small business organized for profit performing a commercially useful function which is owned and controlled by one or more minority individuals or minority business enterprises certified by the Office of Minority Business Development, City of New Orleans. Owned and controlled means a business in which one or more minorities or minority business enterprises certified by the Office of Minority Business Development, City of New Orleans own at least fifty-one percent or in the case of a corporation at least fifty-one percent of the voting stock and control at least fifty-one percent of the management and daily business operations of the business.

SECTION 2

SPECIAL CLAUSES

SECTION 2

SPECIAL CLAUSES

SC 01 DESCRIPTION OF WORK

The Plans, Specification and other Contract Documents provide for the complete construction of a section of a floodwall which is a part of the Lake Pontchartrain Louisiana and Vicinity, High Level Orleans Parish Lakefront Levee West of I.H.N.C. The Hurricane Protection Project is located on the west side of the Inner Harbor Canal in the vicinity of France Road, the Southern Railway, and the Seabrook Bridge.

The project floodwall extends from an existing I-wall on the west side of France Road to an existing levee on the South side of Lake Shore Drive and includes floodgates at France Road, the South Service Road adjacent to the Seabrook Bridge (Boat Launch Road), and the Southern Railway tracks.

The work to be performed under this contract includes furnishing all labor, materials, equipment, tools, transportation and supplies necessary for the construction of the project complete in every detail in accordance with the plans, specifications and contract documents.

The work shall include, but is not limited to, the following items:

1. Clearing and grubbing.
2. Excavation for floodwalls, and miscellaneous construction.
3. Construction of a temporary falsework trestle at the Southern Railway.
4. Furnishing and driving prestressed concrete piles.
5. Furnishing and driving permanent steel sheet piles.
6. Removal and reconstruction of a portion of Boat Launch Road.
7. Modification, relocation, removal and/or construction of drains, force mains, sewers, waterlines and electrical conduits.
8. Construction of floodwalls and floodgate structures and fabrication and installation of floodgates.
9. Backfilling around completed structures.

SC 01 (Cont'd.)

10. Removal of the temporary falsework trestle and restoration of the Southern Railway track structure.
11. Backfilling and grading the site.
12. Seeding and fertilizing.

SC 02 LIST OF DRAWINGS IN THE CONTRACT

The drawings governing the work in this contract OLB Project No. 2042-0344 are as follows:

Drawing Title	Drawing No.	Revision No.
Site Plan	C1	0
Plan and Profile Sheet 1 of 4	C2	0
Plan and Profile Sheet 2 of 4	C3	0
Plan and Profile Sheet 3 of 4	C4	0
Plan and Profile Sheet 4 of 4	C5	0
Typical Sections Sheet 1 of 3	C6	0
Typical Sections Sheet 2 of 3	C7	0
Typical Sections Sheet 3 of 3	C8	0
Hayne Blvd. Access Ramp	C9	0
Relief Well Sections and Details	C10	0
Specifications for Installation of Sewer, Drain, and Water Mains	C11	0
Typical Wall Sections Sheet 1 of 2	S1	0
Typical Wall Sections Sheet 2 of 2	S2	0
Typical Wall Sections Utility Penetration Details	S3	0
Prestressed Concrete Piles	S4	0
Gate Monolith Gate No. 1	S5	0
Gate Monolith Gate No. 2	S6	0
Gate Monolith Gate No. 3	S7	0
Gate Monolith Sections	S8	0
Swing Gate No.2	S9	0
Swing Gate No. 2 Sheet 1 of 2 Seal Details	S10	0
Swing Gate No. 2 Sheet 2 of 2 Seal Details	S11	0
Swing Gate No. 1	S12	0
Swing Gate No. 3	S13	0
Seal Details Gate No. 1 & No. 3	S14	0
Swing Gate No. 1, 2 & 3, Hinge Details Sheet 1 of 2	S15	0
Swing Gate No. 1, 2 & 3, Hinge Details Sheet 2 of 2	S16	0
Swing Gate No. 1, 2, & 3, Latching Details	S17	0
Railroad Falsework Details	S18	0
Utility and Pavement Details and Sections	S19	0

SC 03 BIDDER'S QUALIFICATIONS

Proposals will be received only from those Contractors who are licensed by the Louisiana State Licensing Board for Contractors, under Louisiana Revised Statutes 37:2157 through 37:2163, as amended, and are qualified to perform the work called for in the specifications.

No proposal will be considered from any bidder unless he is known to be a skilled and reputable contractor, qualified to do construction work in the State of Louisiana. In order to aid the Board in determining the responsibility of any bidder, the bidder shall furnish with his bid evidence satisfactory to the Board of the Bidder's experience and familiarity with work of the character specified. (These qualifications shall be in addition to those required under the Louisiana State Licensing Board for Contractors under Louisiana Revised Statutes 37:2157 through 37:2163, as amended.)

SC 04 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE OF WORK

The bidder shall carefully examine the site of the proposed work, the proposal plans, project specifications and contract forms before submitting a bid. The submission of a bid shall be considered evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the plans, project specifications and contract forms.

It shall be understood that soil boring data furnished in this contract is for the Contractor's convenience only. The Contractor is solely responsible for conducting his own soil boring explorations, at his own expense and as he deems necessary in preparing his bid, to determine the nature and extent of subsurface conditions that he may encounter.

No claim shall be made against the Board for any additional compensation incurred as a result of unforeseen subsurface conditions arising during the progress of the work and which might be in variance with the soil boring data shown on the plans.

SC 05 CONTRACT TIME

Thirty (30) calendar days after execution of the Agreement by the Board, the Board will issue a Work Order to the Contractor. The Contract Time will begin on the date of issuance of the Work Order.

The Contract Time will end with the completion of the work and Acceptance by the Chief Engineer. Acceptance will be evidenced by the issue of a Certificate of Acceptance by the Chief Engineer and the date of issue of this Certificate will be the last day of the contract time.

SC 05 (Cont'd.)

The Contract shall be completed in every respect, including the repair of all damages to public and private property resulting from the work within 180 consecutive calendar days after the date of issuance of the Work Order. The time stated for completion shall also include the final clean-up of the site.

SC 06 LIQUIDATED DAMAGES FOR FAILURE TO COMPLETE ON TIME

For each calendar day that any work shall remain uncompleted after the time specified for the completion of the work required by the contract, the sum of five hundred (\$500.00) dollars shall be deducted from any money due the Contractor not as a penalty but as liquidated damages. Time Extensions, approved in writing, will be recognized and the Completion Time adjusted accordingly before liquidated damages are deducted.

Permitting the Contractor to continue the work after expiration of the contract time shall not be a waiver on the part of the Board of any of its rights under the contract.

SC 07 WORK SCHEDULING AND PROGRESS CHARTS

Project Schedule. The Contractor shall prepare for the Owner's review and approval a CPM network schedule demonstrating his plan for fulfilling all Contract requirements.

Information in this schedule shall be comprehensive and shall represent all activities including submittals, submittal reviews, and procurement necessary to complete this Contract.

The CPM network shall include all field test activities, such as functional, performance, and vibration tests, and shall include cost allocations for each test.

The diagram technique to be used shall be in accordance with conventional CPM activity (I-J) technique set forth in the Associated General Contractors of America publication: "CPM in Construction, A Manual for General Contractors," copyright 1976. In addition to the above information, the Contractor shall also provide the information listed below for each activity in the schedule.

- a. Duration - Work Days Required. Indicate each CPM single trade activity utilizing a standardized work day calendar. Said calendar will be based upon a 5-day work week. Durations per single activity node shall be limited to 20 work days. Additional nodes shall be used as required.
- b. Area Code Number. Designate the location of the work to be accomplished within a specified zone.
- c. Activity Code. Identify the work category from a list of standard codes furnished by the Owner. This code list may be expanded with a copy of any additions included with the network submittals.
- d. I-J Numbers - Start and Finish. Provide space as indicated on the Activity Diagram. Contractor's I-J number assignment is not required, but if used for the Contractor's purpose, will be superseded by the Owner's assignment of I-J numbers on the accepted CPM diagram for use in the Owner's cost control and progress reporting purposes.
- e. Cost Allocation. The Contractor shall assign the cost of work, a sum including allocation for materials, labor, equipment, overhead, and profit, to each activity. Cost per activity node shall not exceed \$40,000 unless expressly accepted by the Owner. Additional nodes shall be used as required. The Contractor shall include this information on his original network submittal. The Contractor shall provide the Owner, upon request, the Contractor's backup cost information, including unit prices for excavation, backfill, concrete, etc., for allocating cost.
- f. CPM Submittal. The Contractor shall submit to the Engineer for review and approval the complete CPM network schedule and related information at the time the Contract is signed and executed by the Contractor. Contractor shall also assign costs to each activity item indicated for such work on the date of contract execution.

Each initial schedule network diagram and all subsequent revisions thereto shall be submitted in one reproducible and three print copies of each sheet. Individual sheets shall not exceed 36 inches by 60 inches. The reproducible shall be without I-J numbers. If

the Contractor elects to computerize his CPM schedule, he shall submit three copies of the computerized analysis to assist the Owner's review of his schedule.

- g. Schedule Narratives. Prepare detailed narrative statements of assumptions and conditions that provide supportive information for conclusions represented in each network schedule submitted. Such narrative shall accompany the CPM network submittals.

Indicate proposed area for work and for storage of specific materials, proposed use of equipment, assumptions, and methods that determine durations and sequences represented in specific areas of network analysis and schedule. Additionally, submit specific narrative statements relating to control and expediting of submittals, fabrication, and delivery of specific materials and equipment, and to supplement progress reports and successive revisions of the project schedule.

- h. Review and Approval. Within 5 working days after receipt of the initial CPM network activity listing, the Owner will meet with the Contractor for joint review, correction, or adjustment of the Contractor's proposed approach. Within 5 days after the joint review, the Contractor shall submit a revised program reflecting agreements reached during the joint review. The Owner will review this resubmission, and if he determines that it is as previously agreed, he will accept it in writing. The accepted program will constitute the Contractor's project work schedule until it is subsequently revised by the Contractor and accepted by the Owner.

To the extent that the accepted network, or revisions thereto, indicate anything not jointly agreed upon, it shall be deemed to be not accepted by the Owner. Any omission of project work from the CPM network or activity listing, otherwise required for contract compliance, will not excuse the Contractor from completing such work within any applicable completion data.

- j. Schedule Review and Update. Bi-weekly, on dates mutually agreed upon, a jobsite meeting will be held to review the CPM network, activity listing, and job progress. The conditions under which a revision of the schedule will be required as follows:

When delay in completion of any work item or sequence of work items results in an estimate extension of project completion by either 20 working days or by 5 percent of the remaining duration of time to complete the contract, whichever is less.

When delays in submittals or deliveries or work stoppages are encountered that make replanning or rescheduling of the work necessary.

When the schedule does not represent actual prosecution and progress of the work.

When contract modification necessitates schedule revision. The Contractor shall submit a subnetwork analysis of all change work with his proposal. If accepted, this subnetwork will become a part of the accepted schedule.

As part of this monthly review, the Contractor shall prepare a brief narrative report relating to the status of construction, submittals, approvals, and procurement. This report shall indicate areas where problems exist and are anticipated and shall prescribe action needed to be taken by the Owner or by the Contractor.

- k. Contractor's Representative. The Contractor shall designate an authorized representative who shall be responsible for production and review of the network diagram and who shall assume responsibility for reviewing progress of the work with the Owner. The contractor's representative shall have direct control and complete authority to act on behalf of the Contractor; and such authority shall not be interrupted throughout the duration of the Contract, without acceptance of the Owner.
- l. Schedule Formats. Contractor shall provide all required CPM schedule input information. Contractor shall revise his input format as directed by the Engineer.
- m. Progress Report Form. The Owner will prepare report listings formulated in the sequences of "Scheduled Start by Weeks" and "Scheduled Finish by Weeks," or other sequence as convenient to report job progress, which will be the official reporting form for construction progress on this Contract.
- n. Report Procedures. Utilizing the Progress Report form, the Owner and the Contractor shall mutually determine and indicate the "Percent Complete This Period" or "Units in Place This Period" for each activity listed for the reporting period. The owner will process this information to prepare monthly progress payments and to analyze the CPM construction schedule.
- o. Progress Payment. The approved CPM activity list and assigned costs will constitute the basis for monthly progress payments

SC 07 (Cont.d)

wherein "Percent (or Units) Complete This Month," multiplied by "Total Cost (or Unit Costs) per Activity," will be reported to the Owner as a part of the Contractor's monthly progress payment request. Payments will not be made until the CPM activity list and assigned costs are accepted by the Owner.

SC 08 LAYOUT AND MEASUREMENT

The Chief Engineer will provide monuments for alignment and grade which in his judgement are necessary to enable the Contractor to proceed with the Work. The Contractor shall be responsible for surveying and layout of the Work, and shall protect and preserve the established reference points and shall make no changes or relocations without prior written approval of the Board. He shall report to the Chief Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations. The Contractor shall replace and accurately relocate all reference points so lost, destroyed or moved.

Before ordering material and performing work, the Contractor shall verify all measurements that may be required for the proper fitting of various parts of his work or the joining of his work to other work. He shall be responsible for the correctness of the measurements and shall satisfactorily correct, without extra cost to the Board, any of his work which does not fit, furnishing new work, if necessary, for the purpose. Adapting all work to all field variations is the Contractor's responsibility. No extras will be allowed because of minor differences between actual dimensions and dimensions shown on the drawings.

SC 09 PERMITS

Before beginning work, the Contractor shall obtain, at his expense, any permits required by the City of New Orleans, Office of Regulatory Inspection, Building Inspection Division. The Contractor shall also obtain at his expense any necessary Inspection Certificates required after the work is completed. Evidence of compliance with these requirements shall be furnished to the Board.

SC 10 SHOP DRAWINGS

The term "shop drawings" includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedule, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract.

A schedule of shop drawings submittals shall be furnished to the Chief Engineer with the progress schedules required by these specifications.

After checking and verifying all field measurements, the Contractor shall submit to the Chief Engineer for approval five copies of all Shop Drawings, which shall have been checked by and stamped with the approval of the Contractor and identified as the Chief Engineer may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable the Chief Engineer to review the information as required.

At the time of each submission, the Contractor shall in writing call the Chief Engineer's attention to any deviations that the Shop Drawings may have from the requirements of the Contract Documents. If the Chief Engineer approves any such deviation(s) he shall issue and appropriate contract modification, except if the deviation is minor, and does not involve a change in price or in time of performance, a modification need not be issued.

The Chief Engineer will review and approve the Shop Drawings with reasonable promptness but his review and approval shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. The Contractor shall make any corrections required by the Chief Engineer and shall return the required number of corrected copies of Shop Drawings until approved. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by the Chief Engineer on previous submissions. The Contractor's stamp of approval on any Shop Drawing or sample shall constitute a representation to the Board and the Chief Engineer that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the Project and Contract Documents.

Where a Shop Drawing submission is required by the Specifications, no related work shall be commenced until the submission has been approved by the Chief Engineer. A copy of each approved Shop Drawing shall be kept in good order by the Contractor at the site and shall be available to the Chief Engineer.

SC 10 (Cont'd)

The Chief Engineer's approval of Shop Drawings shall not relieve the Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless the Contractor has in writing called the Chief Engineer's attention to such deviation at the time of submission and the Chief Engineer has given written approval to the specific deviation, nor shall any approval by the Chief Engineer relieve the Contractor from responsibility for errors or omissions in the Shop Drawings.

At the conclusion of the work and before processing the final estimate the Contractor shall furnish to the Board "As Built" reproducibles on 3 mil polyester film, matte finish, of all approved shop drawings which show details of items which are a part of the finished work or items which are to remain in place at the end of the project.

SC 11 SAFETY AND PROTECTION

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

- a. all Employees on the Work and other persons who may be affected thereby,
- b. all the Work and all materials or equipment to be incorporated herein, whether in storage on or off the site, and
- c. other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for its safety and protection. He shall notify owners of adjacent utilities when prosecution of the work may affect them.

The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated in writing by the Contractor to the Board.

All damage, injury or loss to any property referred to in paragraphs b and c caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor or anyone directly or indirectly employed any of them or anyone for whose acts any of them may be liable, shall be remedied by the Contractor. The Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and the Chief Engineer has issued a Certificate of Acceptance.

In emergencies affecting the safety of persons or the work or property at the site or adjacent thereto, the Contractor without special instructions or authorization from the Chief Engineer or the Board, is obligated to act, at his discretion, to prevent threatened damage, injury or loss. Any compensation claimed by the Contractor, shall be determined by agreement.

The Contractor must protect and support all water, sewer and gas pipes or other conduits and buildings, walls, fences or other properties which are liable to be damaged during the execution of his work. He shall take all reasonable and proper precautions to protect persons, animals and vehicles of the public from injury, and shall erect and maintain a fence or railing around all excavation and place a sufficient number of warning lights about the work and keep them burning from twilight until sunrise, and shall employ one or more watchmen as an additional security. He must, as far as practicable and consistent with good construction, permit access to private and public property and leave fire hydrants and catch basins free from encumbrances. He must restore, at his own expense, all injured property caused by any act of omission or commission on his part, or on the part of his agent, including sidewalks, curbing, pipes, conduits, sewers and other public or private property, to a condition as good as it was when he entered upon the work.

In case of failure on the part of the Contractor to restore such property or make good such damage, the Chief Engineer may upon forty-eight (48) hours notice proceed to repair, rebuild or otherwise restore such property as may be deemed necessary, and the cost thereof, will be deducted from any monies due, or which may become due, under this contract.

There will be no direct payment for erecting and maintaining a fence or railing around excavations, placing warning lights and providing watchmen and supporting and protecting utilities as prescribed herein and the cost thereof shall be included in the prices bid for pay items in the Contract.

SC 12 SANITARY PROVISIONS

The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements and regulations of the Federal, State and local health authorities having jurisdiction, and he shall take such precautions as are necessary to avoid creating a public nuisance. All sanitary installations for use during construction shall be removed from the project by the Contractor before acceptance of the work.

SC 13 WORK ON OR ADJACENT TO STREETS AND HIGHWAYS

The Contractor shall be responsible for providing, erecting and maintaining warning signs, lanterns, barricades and other safety devices and shall, when necessary or required by provisions of this contract, provide flagmen for protection of traffic. When the construction work is on, or adjacent to, public or private streets and roads, they shall, unless otherwise specified, be kept open to traffic during construction.

Traffic on haul routes shall not be obstructed by the Contractor's operations. These routes shall be kept free of debris caused by construction activities and, at the conclusion of work on the project, any damage caused by the Contractor shall be repaired and the streets cleaned, if necessary, to remove spillage or debris.

The Contractor and his subcontractors and suppliers shall comply with all legal load regulations and shall obtain all required permits.

SC 14 LABOR, MATERIALS AND EQUIPMENT

The Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. He shall at all times maintain good discipline and order at the site.

The Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water and sanitary facilities and all other facilities and incidentals necessary for the execution, testing, initial operation and completion of the work.

All materials and equipment shall be new, except as otherwise provided in the Contract Documents. When required by the Chief Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

SC 14 (Cont'd)

All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator or processors, except as otherwise provided in the Specifications.

All materials required for the various items of work shall be furnished by the Contractor, except those specifically shown on the plans as being furnished by others.

SC 15 SUNDAY, HOLIDAY, AND NIGHT WORK

When the Contractor elects to work on Sundays, holidays, or nights, notice of his intention to do so shall be given to the Chief Engineer, in writing, sufficiently in advance of commencement of such operations to permit suitable arrangements for inspection to be made. Adequate lighting for thorough inspection of night operations shall be provided by the Contractor at his own expense.

SC 16 SUBSTITUTE MATERIALS OR EQUIPMENT

If any materials or equipment called for on the plans or in these specifications is not obtainable and/or the Contractor wishes to furnish or use a proposed substitute, he shall make written application to the Chief Engineer for approval of such a substitute certifying in writing that the proposed substitute will perform adequately the functions called for by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function as that specified; stating whether or not its incorporation in or use in connection with the Project is subject to the payment of any license fee or royalty; and identifying all variations of the proposed substitute from that specified in indicating available maintenance service. No substitute shall be ordered or installed without the written approval of the Chief Engineer who will be the judge of equality and may require the Contractor to furnish such other data about the proposed substitute as he considers pertinent.

SC 17 WORK BY OTHERS

Relocation of the following utilities and improvements as shown on the drawings, will be performed by their respective owners:

1. Electrical Power Lines New Orleans Public Service, Inc.
 P.O. Box 60304
 New Orleans, Louisiana 70160

SC 17 (Cont'd)

2. Gas Lines

New Orleans Public Service, Inc.
P.O. Box 60304
New Orleans, Louisiana 70160

Other Contractors may be working in the vicinity of the job site during the execution of this contract. The Contractor shall cooperate with other Contractors in the area and shall organize his work so as not to interfere with or delay in any way, the work of the other Contractors. The Chief Engineer reserves the right (should it be to the best interest of the Board) to arbitrate questions of conflict between contracts and his decision on these matters will be final.

SC 18 LABORATORY TESTING

An independent testing laboratory may be engaged by and at the expense of the Board for the purposes of conducting such inspections and tests of work and materials as are deemed necessary by the Board.

The selection of the testing laboratory by the Board shall be understood as in no way relieving the Contractor of his responsibility for Contractor Quality Control or the satisfactory performance of the work in full conformance with requirements of the Contract.

SC 19 PAYMENT FOR MATERIALS ON HAND

When approved by the Chief Engineer, advance payments may be made for manufactured or fabricated items that are to be incorporated into the project when such items are properly stored or stockpiled on the project or in acceptable facilities outside the limits of the project but within the boundaries of the State of Louisiana. Payment will be limited to those materials that are durable in nature and represent a significant portion of the project cost. These materials will include but not necessarily be limited to steel sheet piling, foundation piling, reinforcing steel and the flood gates.

Payment for materials will be at the invoice price for the material plus freight and taxes. The quantity of material for payment shall not exceed the total estimated quantity required to complete the project. The addition of contractor mark-ups on materials will not be permitted.

To obtain payment the Contractor shall make application with a regular monthly estimate on the prescribed form "Periodical Estimate for Partial Contract Payment". The following documents must be furnished with each application before approval can be made:

SC 19 (CCont'd)

1. A copy of the original paid invoices from the supplier or manufacturer verifying the cost and quantity of material, freight cost and taxes.
2. If storage is on private property, a copy of the lease or agreement granted the Board right of entry to the property.
3. A notarized certification from the supplier or manufacturer attesting to fact that the materials comply with the requirements of the plans and specifications for this project. If the materials were inspected at the site of manufacture by a testing laboratory, a copy of their inspection report shall be furnished in lieu of a certification.

Payment for stockpiled materials will not constitute acceptance of the materials and any material which does not meet the requirements of the specifications will be rejected even though previous payment may have been made. The Contractor will be responsible for any loss of or damage to materials for which payment has been made.

Payments for materials on hand will be subject to the retainage requirements of the contract. Appropriate deductions from stockpiled materials shall be made as the materials are incorporated into the work.

SC 20 PROGRESS PHOTOGRAPHS

During each month when construction work is in progress, the Contractor shall take, or have taken by a competent commercial photographer, five color progress photographs showing details of the work and progress. Two 8 X 10 inch glossy prints of each of the five different views shall be furnished to the Chief Engineer with each estimate. Each photograph shall be neatly and uniformly identified with the project name, description of view and date when the photograph was taken.

No direct payment will be made for Progress Photographs and the cost thereof shall be included in the prices bid for pay items in the Contract.

SC 21 ENGINEER'S FIELD OFFICE

The Contractor shall furnish and maintain, throughout the contract period, for the exclusive use of the Resident Inspector, a temporary waterproof building, mobile office or trailer, to be utilized as a field office. It shall be conveniently located at the site of construction and shall be independent of any building, or trailer used

by the Contractor. Toilet Facilities and potable water shall be provided within the Engineer's field office or adjacent thereto. The field office shall be equipped with a telephone and approved electrical wiring including adequate ceiling lighting, at least one double convenience outlet on each wall, and the required switches and fuses, to provide 110-volt power for lighting and receptacles.

The field office shall be equipped with an air conditioning unit to provide cooling in warm or hot weather, and a heater, properly installed and vented in accordance with the National Fire Protection Association Code, for heating in cold weather, as required. The Contractor shall make the necessary arrangements to obtain or to generate the power required to operate the air conditioning unit, lights, and receptacles and the power or fuel required for the heater, and shall bear the cost thereof.

A drafting table providing a working surface having dimensions of at least 4 feet by 6 feet (which may consist of a piece of plywood, at least 3/4 inch thick, hinged to a wall of the building, with hinged legs) shall be installed in the building. The building shall have a built-in locker, extending from the floor to the ceiling, having dimensions of at least 2 feet by 5 feet, with a shelf 12 inches from the top, and one door equipped with two hinges, a hasp and a padlock. The outside door of the building shall be equipped with butt hinges and a cylinder lock. The window frames shall be equipped with iron security guards. One draftsman's stool, two strong chairs, and one desk shall be provided.

The building or trailer shall conform to the following minimum requirements:

Ceiling height, not less than	6 feet 9 inches
Floor space, not less than	240 square feet
Windows, not less than	3
Doors, outside	1
Rooms	1

Screens shall be furnished on doors and windows; walls and ceilings shall be insulated; and interior walls shall be finished.

SC 21 (Cont'd)

The building, or trailer, shall be removed by the Contractor after completion of all work under this contract and before final acceptance thereof. No separate payment will be made for furnishing, maintaining, providing the prescribed utilities, and removing the Engineer's field office. In event the Contractor fails to furnish the required facilities, the Board may elect to procure the required facilities and deduct all costs from amounts due or to become due under this contract.

SC 22 PROJECT SIGN

Prior to commencement of work, the Contractor shall construct a project sign at the location designated by the Chief Engineer. The sign shall be 8'-0" wide by 6'-0" high and will identify the work as a project of the Board of Levee Commissioners of the Orleans Levee District. It shall be constructed of durable weatherproof materials and installed on an adequate support frame. Format for the sign will be furnished to the Contractor by the Board following award of the Contract.

Following completion of the work, the sign shall become the property of the Contractor and shall be removed from the job site.

SC 23 REQUIRED INSURANCE

Before commencing any work under this contract adjacent to or on the premises of the Railroad Company, the Contractor will be required to procure and keep in effect during the period of such work, at his own cost and expense, the following kinds and amounts of insurance:

1. Contractor's Public Liability and Property Damage Liability Insurance Similar insurance in the same amounts will be provided by or in behalf of any sub-contractor to cover their operations.
 - a. Bodily Injury Liability \$2,000,000 each person
 \$2,000,000 each occurrence
 - b. Property Damage Liability \$2,000,000 each person
 and
 Physical Damage to Property \$2,000,000 each person
2. Contractor's Protective Public Liability and Property Damage Liability Insurance.

This insurance will be required in addition to the above when any work is performed by subcontractors.

- a. Bodily Injury Liability \$2,000,000 each person
 \$2,000,000 each occurrence

- b. Property Damage Liability
 and
Physical Damage to Property \$2,000,000 each occurrence

- 3. Railroad's Protective Public Liability and Property
Damage Liability Insurance.

This insurance policy will name the individual Railroad Company involved as insured with respect to the operations of the Contractor or any subcontractor employed by the Contractor and shall be on the form of Railroad Protective Policy as accepted by the Association of American Railroads and Mutual Insurance Rating Bureau.

- a. Bodily Injury Liability \$2,000,000 each person
 \$2,000,000 each occurrence

- b. Property Damage Liability
 and
Physical Damage to Property \$2,000,000 each occurrence
 \$6,000,000 aggregate

b. The Contractor shall not commence any of the said work until evidence of such insurance is furnished to the Chief Engineer and the Railroad Company in a form satisfactory to them. In addition, the Contractor shall furnish evidence of a commitment by the Insurance Company to notify the Board and the Railroad Company in writing of any material change or cancellation of the insurance required hereunder not less than 30 days before such change or cancellation is effective.

c. Certificates of Insurance, notifications and other related communications with the Railroad shall be addressed to:

Mr. Phil Sarris
Southern Railway Company
99 Spring Street
Atlanta, Georgia 39303

SC 23 (Cont'd)

The certificates shall contain the following description of work:

Board of Commissioners
Orleans Levee District
Project No. 2042-3044
Seabrook Floodwall Extension
Floodwall and Floodgate Construction

d. No extra allowance will be made for insurance required hereunder, the entire cost of same shall be included in the unit prices bid for the several pay items in the Contract.

SC 24 QUANTITY SURVEYS

a. Quantity surveys shall be conducted, and the data derived from these surveys shall be used in computing the quantities of work performed and the actual construction completed and in place.

b. The Board shall conduct the original and final surveys and make the computations based on them. The Contractor shall conduct the surveys for any periods for which progress payments are requested and shall make the computations based on these surveys. All surveys conducted by the Contractor shall be conducted under the direction of a representative of the Chief Engineer, unless the Chief Engineer waives this requirement in a specific instance.

c. Promptly upon completing a survey, the Contractor shall furnish the originals of all field notes and all other records relating to the survey or to the layout of the work to the Chief Engineer, who shall use them as necessary to determine the amount of progress payments. The Contractor shall retain copies of all such material furnished to the Chief Engineer.

SC 25 RIGHTS-OF-WAY.

a. Rights-of-way for construction purposes and for access through private lands to the work site will be furnished by the Board without cost to the Contractor, as shown on the contract drawings. If the right-of-way for access is used by the Contractor, he shall, at his expense, be required to do all work necessary to make such right-of-way suitable for traveling to and from the work site. Upon completion of the contract work, any such access roadway and right-of-way furnished by the Board shall be left in a condition satisfactory to the Chief Engineer.

SC 25 (Cont'd)

b. The Contractor shall procure, without expense or liability to the Board, all additional lands, access roads, or rights-of-way desired for his own convenience in the performance of the work. The Contractor shall notify the Chief Engineer of his intention and, if required by the Chief Engineer, secure clearances from both the Louisiana State Historical Preservation Office and the Louisiana Archaeological and Antiquities Commission. Any agreements or permits with parishes, or political subdivisions for moving material and equipment will also be the responsibility of the Contractor. Any delays to the Contractor resulting from delays in procuring such additional lands, access roads, right-of-way, or permits for moving material and equipment for his own use will not be made a basis of any claim for increase in the cost or time of performance of the work. The Contractor shall make his own investigations to determine the conditions, restrictions, and difficulties which may be encountered in the transportation of material and equipment to the work site.

SC 26 SUBMITTALS.

The Contractor shall complete and submit to the Chief Engineer at the preconstruction conference, in duplicate, submittal register ENG Form 4288 (Exhibit A) listing all submittals and dates. In addition to those items listed on Exhibit A, the Contractor will furnish submittals for any deviation from the plans or specifications. The scheduled need dates must be recorded on the document for each item for control purposes. In preparing the document, adequate time (minimum of 30 days or more) will be allowed for review and approval and possible resubmittal. Scheduling shall be coordinated with the approved progress schedule. The Contractor's Quality Control representative shall review the listing at least every 30 days and take appropriate action to maintain an effective system. Copies of updated or corrected listings shall be submitted to the Chief Engineer at least every 60 days in the quantity specified. Payment will not be made for any material or equipment which does not comply with contract requirements.

NOTE: The submittal listing in tabular form, of technical items the Contractor shall submit to the Chief Engineer, as indicated in the contract requirements are attached at the end of the Special Clauses.

SC 27 CERTIFICATES OF COMPLIANCE

Any certificates required for demonstrating proof of compliance of materials with specification requirements shall be executed in 3 copies. Each certificate shall be signed by an official authorized to certify in behalf of the manufacturing company and shall contain the

SC 27 (Cont'd)

name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material if, after tests are performed on selected samples, the material is found not to meet the specific requirements.

SC 28 UTILITIES AND IMPROVEMENTS.

a. All known utilities within the limits of the work, such as pipes, communication lines, power lines, etc., that would interfere with construction work will be removed, modified or relocated by local interest or utility companies at no cost to the Contractor unless otherwise noted in the plans and/or specifications. The Contractor, however, shall cooperate with the authorities or company representatives and shall conduct his operations in such manner as to result in a minimum of inconveniences to the owners of said utilities. The Contractor shall be required to give the Chief Engineer 30 days written notice prior to the date utilities must be moved.

b. Any unidentified pipes or structures which may be found within the limits of the work during the course of construction shall not be disturbed nor shall construction or excavation be performed at these locations unless and until approved by the Chief Engineer. Payment for ordered excavation, if any, will be made in accordance with contract unit price for miscellaneous excavation (cost/yd).

SC 29 TRAFFIC MANAGEMENT PLAN.

1. Gate No. 1. The roadways at Gate No. 1 will be closed to traffic for constructing the foundations and base slabs of the gate monoliths. In addition, the Contractor shall perform the following:

a. Provide a temporary shell by-pass road as shown on the drawings to route traffic around the construction site.

b. Provide all necessary construction signing at Gate 1 in accordance with Para. 2H-3.

c. Coordinate traffic signing with the Orleans Levee District through the Chief Engineer.

SC 29 (Cont'd)

2. Gate No. 3. The roadways at Gate No. 3 will be closed to traffic for constructing the foundations and base slabs of the gate monoliths. The Contractor shall provide all necessary construction and detour signing in accordance with para. 2H-3. Traffic signing shall be coordinated with the Orleans Levee District. The contractor shall conduct his work in such a manner so that the roadway will be closed for a minimum amount of time. The Contractor shall furnish a proposed time schedule for this work and shall not commence road closing until the time schedule is approved by the Chief Engineer.

Payment for all signs and barricades and other related work will be included in the contract lump sum price for "Incidental Paving".

SC 30 INTERIM HURRICANE PROTECTION

In the event the Orleans Levee Board needs to access the construction site to prepare for an impending hurricane, the Contractor shall assist the OLB by providing access to any area designated within the construction right-of-way for equipment, material or personnel the OLB so requires. The Contractor will not receive extra monetary compensation for these tasks but will be afforded a time extension to remove any temporary barricades/sandbags/levees that directly interfere with the Contractor's work progress.

SC 31 SPECIAL CONSTRUCTION UNDER SEABROOK BRIDGE

The Contractor shall submit for approval a construction plan for driving the sheet pile under the Seabrook Bridge between stations 9+00 and 10+05.

Exhibit A

SUBMITTAL REGISTER		TITLE AND LOCATION		CONTRACT NUMBER		CONTRACTOR		ACTION		SCHEDULED DATES		COMPS		REMARKS
NAB ACTIVITY CODE	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF SUBMITTAL	TYPE OF SUBMITTAL	TECH REVIEW BY	APPROVAL NEEDED BY	MATERIAL NEEDED BY	SUBMITTED TO COMPS	ACTION DATES	ACTION CODE	REMARKS				
	2D-2(9)	Moisture Control	✓											
	2D-3.4	Alternative Compaction Equip.	✓											
	2F-3.2 & 4.6	Concrete Mix & Curing	✓											Field Test
	2F-3.3	Operation	✓											
	2F-4.2	Admixtures	✓											
	2F-4.5	Grade 270 Strands	✓											
		Special Embedded or Attached	✓											
		Lifting Devices	✓											
	2G-3.2	Sheet Piling Type, Dimensions and Interlock Strength	✓											
	2H-8.1	Asphalt Testing	✓											
	2H-8.2.1	Concrete Mix Design	✓											
	2H-8.2.2	Inspection and Testing	✓											
	2I-6.2.1	Fertilizer Quantitative	✓											
	2I-6.2.2	Analysis Report	✓											
	2I-6.2.2	Seed	✓											
	2I-6.2.3	Mulch	✓											
	2I-6.2.4	Asphalt Adhesive	✓											

Exhibit A

SUBMITTAL REGISTER (AIA 418-1-10)		TITLE AND LOCATION CONTRACTOR		CONTRACT NUMBER								
NAS ACTIVITY CODE	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF SUBMITTAL	TYPE OF SUBMITTAL			ACTION ELEMENT	CONTRACTOR SCHEDULED DATES		COMPS ACTION DATES		REMARKS	
			1-00 DRAWING	2-01 SAMPLE	3-01 DATA		4-01 CERTIFICATE	5-01 TEST REPORT	SUBMIT	APPROVAL NEEDED BY		MATERIAL NEEDED BY
	3A-3	Formwork	X									
	3B-5	Reinforcing Steel	X									
	3C-5.1	Expansion Joint Filler Strips										
	3C-5.1	Compression Seals and										
		Lubricant										
	3C-5.2.1	Water Stops and Splices										
	3D-3.1	Source of Materials										
	3D-3.1.1	Aggregate Samples										
	3D-5.1.1	Aggregate Tests										
	3D-5.1.2	Concrete Mixture Proportions										
	3D-5.1.3	Cement and Fly Ash										
	3D-5.1.4	Non-Shrink Grout										
	3D-5.1.5	Water										
	3D-5.2.1	Air Entraining Admixture										
	3D-5.2.2	Water Reducing Admixture										
	3D-5.3.1	Batch Plant										
	3D-5.3.2	Mixers										
	3D-5.3.3	Conveying Equipment										

For Info. Only

For Info. Only

Exhibit A

SUBMITTAL REGISTER		(N/A J18-1-10)	TITLE AND LOCATION CONTRACTOR	CONTRACT NUMBER								REMARKS					
NAB ACTIVITY CODE	IDENTICAL SUBMITTAL ITEM NUMBER	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF SUBMITTAL	TYPE OF SUBMITTAL							ACTION ELEMENT		CONTRACTOR SCHEDULED DATES		CONPS		
				1-OF DRAWING	TABLE	GUARANTEES	SENT DATA	CERTIFICATE	TEST REPORT	OTHER REPORT	*TECH REVIEW BY	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	SUBMITTED TO CONPS	ACTION DATES	ACTION CODE
		3D-5.3.4	Placing														
		3D-5.3.5	Joint Clean-up														
		3D-5.3.6	Curing														
		3D-5.3.7	Cold Weather														
		3D-5.3.8	Hot Weather														
		5A-4.2.3	Hinges														
		5B-4.1	Catalog Cuts, Templates and etc.														
		5B-4.2	Purchase Mill Orders and etc.														
		5C-3	Swing Gates														
		9A-6	Coal Tar Epoxy Paint														
		10A-2.1	Srew Jacks														
		10A-2.10	Gate Stop														
		15A-8.2	Neoprene Rubber Sleeves, etc.														
		15A-8.4	Reinforced Concrete Pipe														

ENR FORM 4288, Apr 84
EDITION OF 1 JUL 73 IS OBSOLETE

ENR Form 4288
ENR Form 4288

Page 01 of 01 Pages

ENR Form 4288, Apr 84

MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Need instructions on the reverse side prior to initiating this form)

REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

RESUBMITTAL

TO:

FROM: CONTRACT NO. _____

TRANSMITTAL NO. _____

PREVIOUS TRANS. NO. (If any)

PROJECT TITLE AND LOCATION

SPECIFICATION SEC. NO. (Cover only one section with each transmittal)

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type, size, model number, etc.)	MFG. OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction No. 8)	SPEC. PARA. NO.	DRAWING SHEET NO.	FOR CE USE CODE		
					a.	b.	c.

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict accordance with the contract drawings and specifications except as otherwise stated.

NAME AND SIGNATURE OF CONTRACTOR _____

APPROVAL ACTION

INCLOSURES RETURNED (List by item No.)

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.
2. Each transmittal shall be numbered consecutively in the space provided for "Transmittal No." This number, in addition to the contract number, will form a serial number for identifying each submittal. For new submittals or resubmittals mark the appropriate box; on resubmittals, insert transmittal number of last submission as well as the new submittal number.
3. The "Item No." will be the same "Item No." as indicated on ENG Form 4788 for each entry on this form.
4. Submittals requiring expeditious handling will be submitted on a separate form.
5. Separate transmittal form will be used for Shop Drawings submitted under separate sections of the specifications.
6. A check shall be placed in the "Variation" column when a submittal is not in accordance with the plans and specifications - also, a written statement to that effect shall be included in the space provided for "Remarks".
7. Form is self-transmitted; letter of transmittal is not required.
8. When a sample of material of Manufacturer's Certificate of Compliance is transmitted, indicate "Sample" or "Certificate" in column e, section I.
9. U.S. Army Corps of Engineers approving authority will assign action codes as indicated below in space provided in section I, column h, to each item submitted. In addition they will ensure inclosures are indicated and attached to the form prior to return to the contractor.

THE FOLLOWING ACTION CODES ARE GIVEN TO ITEMS SUBMITTED

- | | |
|--|---|
| A - Approved as submitted | D - Will be returned by separate correspondence |
| E - Approved, except as noted on drawings.
Resubmission not required. | F - Disapproved (See attached) |
| G - Approved, except as noted on drawings.
Refer to attached sheet resubmission required. | H - Receipt acknowledged |
| | I - Other (Specify) |
10. Approval of items does not relieve the contractor from complying with all the requirements of the contract plans and specifications.

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SECTION 1A - SCOPE OF WORK

1.	Scope of Work	1A-1
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LAKE PONTCHARTRAIN, LOUISIANA AND VICINITY,
HIGH LEVEL PLAN, NEW ORLEANS LAKEFRONT LEVEE,
WEST OF I.H.N.C., SEABROOK FLOODWALL EXTENSION
ORLEANS PARISH, LOUISIANA

SECTION 1A - SCOPE OF WORK

1. SCOPE OF WORK. The project consists of construction of approximately 1,438 linear feet of floodwall and levee consisting of both "I" and "T" types including floodgates at the Seabrook Bridge (South Service Road), at France Road and the Southern Railway Railroad tracks together with levee construction, revision of existing utilities and related work all on the west side of the I.H.N.C.

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SECTION 2A - ENVIRONMENT PROTECTION

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all labor; materials and equipment and performing all work required for the prevention of environmental pollution during and as the result of construction operations under this contract except for those measures set forth in other provisions of these Technical Specifications. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for esthetic and recreational purposes. The control of environmental pollution requires consideration of air, water, and land, and involves noise, solid waste-management and management of radiant energy and radioactive materials, as well as other pollutants.

2. QUALITY CONTROL..

2.1 General. The Contractor shall establish and maintain quality control for environment protection to assure compliance with contract specifications and maintain records of his quality control for all construction operations including but not limited to the following:

- (1) Submit plan of Environmental Pollution Control.
- (2) Procure applicable Federal, State, and Local regulations on pollution control.
- (3) Air Pollution - Checks made on dust, smoke, noise.
- (4) Water Pollution - Checks made on disposal of water, oil, etc.
- (5) Land Pollution - Checks made on disposal of debris, restoration of temporary construction sites, etc.
- (6) Training Course for Employees.

2.2 Reporting. The original and two copies of these records, as well as the records of corrective action taken, shall be furnished the Board daily. Format of report shall be as prescribed in Special Clauses.

3. APPLICABLE REGULATIONS. In order to prevent, and to provide for abatement and control of any environmental pollution arising from construction activities in the performance of this contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and Local laws, and regulations concerning environmental pollution control and abatement.

4. NOTIFICATION. The Chief Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Chief Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

5. SUBCONTRACTORS. Compliance with the provisions of this section by subcontractors will be the responsibility of the Contractor.

6. IMPLEMENTATION. At the preconstruction conference the Contractor shall:

(1) submit in writing his proposals for implementing this section for environmental pollution control and disposal of debris.

(2) meet with representatives of the Chief Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

7. PROTECTION OF LAND RESOURCES.

7.1 General. The land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. The Contractor shall confine his construction activities to areas defined by the plans or specifications, including borrow areas to be cleared. The following additional requirements are intended to supplement and

clarify the requirements of Contract Clauses for "Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements," "Operations and Storage Areas" and "Cleaning Up".

7.2 Prevention of Landscape Defacement. Except in areas to be cleared, as provided in Section 2-B, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without the approval of the Chief Engineer. Earth that is displaced into uncleared areas shall be removed. All monuments and markers shall be protected before beginning operations near them. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense. Trees that are scarred shall be immediately painted with an acceptable tree wound paint. Any trees which are damaged beyond restoration shall be replaced in like kind or as approved by the Chief Engineer at no additional cost to the Board.

7.3 Temporary Excavation and Embankments. If the Contractor proposes to construct temporary roads or embankments and excavation for plant and/or work areas, he shall obtain approval of the Chief Engineer prior to start of such temporary work.

7.4 Post-Construction Cleanup or Obliteration. The Contractor shall obliterate all signs of temporary construction facilities upon completion of construction. The Contractor will be required to restore the construction area to near natural conditions which will permit the growth of vegetation.

7.5 Recording and Preserving Historical and Archeological Finds. All items having any apparent historical or archeological interest which are discovered in the course of any construction activities shall be carefully preserved. The Contractor shall leave the archeological find undisturbed and shall immediately report the find to the Chief Engineer so that the proper authorities may be notified.

8. PROTECTION OF WATER RESOURCES.

8.1 Contamination of Water. The Contractor shall not pollute lakes, ditches, rivers, bayous, canals, waterways, or reservoirs with fuels, bitumens, calcium chloride, insecticides, herbicides, or other similar materials harmful to fish, shellfish, or wildlife, or materials which may be a detriment to outdoor recreation.

8.2 Disposal of Materials. The methods and locations of disposal of materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., within the right-of-way limits shall be such that harmful debris will not enter lakes, ditches, rivers, bayous, canals, waterways, or reservoirs by erosion, and thus

prevent the use of the area for recreation or present a hazard to wildlife. Disposal methods should be in accordance with applicable Federal, State and Local regulations.

8.3 Erosion Control. Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation ponds or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any one time by construction operations shall not exceed that necessary to perform the work.

8.4 Washing and Curing Water. Water used in embankment material processing, aggregate processing, concrete curing, foundation and concrete lift cleanup, and other waste waters shall not be allowed to re-enter the river if an increase in the turbidity of the river will result therefrom.

9. RESERVED.

10. PROTECTION OF FISH AND WILDLIFE. The Contractor shall at all times perform all work and take such steps required to prevent any interference of disturbance to fish and wildlife. The Contractor will not be permitted to alter water flows or otherwise disturb native habitat adjacent to the project area which are critical to fish and wildlife.

11. JANITOR SERVICES. The Contractor shall furnish daily janitorial services for all the offices, shops, laboratories, or other buildings, being used by the Contractor or the Board employees, whether existing or Contractor furnished, and perform any required maintenance of the facilities and grounds during the life of the contract. Toilet facilities shall be kept clean and sanitary at all times. Services shall be performed at such a time and in such a manner to least interfere with the operations but will be accomplished only when the buildings are in daily use. The Contractor shall also provide daily trash collection and cleanup of outside areas, and shall dispose of all discarded debris, in a manner approved by the Chief Engineer.

12. DISPOSAL OF CLEARED MATERIAL AND OTHER DEBRIS. All debris resulting from construction operations on this contract shall be disposed of in accordance with 2B-6.

13. RESERVED.

14. MEASUREMENT AND PAYMENT. No measurement or separate payment will be made for work covered by this section. The cost of providing environmental protection as specified herein shall be distributed throughout the existing bid items.

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SECTION 2B - CLEARING

PART 1 - GENERAL

1. **SCOPE.** The work covered by this section consists of furnishing all plant, labor, equipment, and materials, and performing all operations necessary for the clearing of the areas specified herein or indicated on the drawings, the demolition of existing streets and sidewalks, and for the removal and disposal of all cleared and demolished materials,

2. **QUALITY CONTROL.** The Contractor shall establish and maintain quality control for clearing operations to assure compliance with contract requirements, and maintain records of his quality control for all construction operations including but not limited to the following:

(1) **Clearing.** Station to station limits, transverse clearing limits from applicable centerline; percentage of area complete; type of material.

(2) **Disposition of Cleared Materials.** Method and location of disposition; damage to timber or improvements which are not to be cleared. The original and two copies of these records of inspections and tests, as well as the records of corrective action taken, shall be furnished to the Board daily. Format of report shall be as prescribed in Special Clauses.

3. **GENERAL REQUIREMENTS.** All clearing work for embankments and berms shall be completed in advance of floodwall construction. If regrowth of vegetation or trees occurs after clearing and before placement of fill, the Contractor will be required to clear the area again prior to floodwall construction, and no payment will be made for this additional clearing.

4. CLEARING.

4.1 **General.** Clearing, unless otherwise specified, shall consist of the complete removal above the ground surface except as indicated below of all trees, stumps, down timber, snags, brush, vegetation, old piling, abandoned structures, fencing, and similar debris.

4.2 **Merchantable Timber.** Merchantable timber remaining within the areas to be cleared on or after the date of award of this contract may be disposed of as the Contractor sees fit, as long as such merchantable timber is either removed from the right-of-way indicated on the drawings or is satisfactorily disposed of in accordance with the provisions of 2B-6.

4.3 Trees. Certain trees, as designated by the Chief Engineer shall be left standing. Trees shall be felled in such a manner as to avoid damage to trees to be left standing, to existing structures and installations and to those under construction, and with due regard for the safety of employees and others.

4.4 Vegetation. Vegetation to be removed shall consist of grass, bushes, and weeds. Close-growing grass and other vegetation shall be removed from areas as to receive semicompacted or road fill to provide a completely bare earth surface immediately prior to foundation preparation. Removal of vegetation from the side of the existing levees shall be limited to 1,000 ft in advance of embankment placement. Acceptance of the vegetation removal operation shall precede the initiation of foundation preparation in the area from which vegetation has been removed. For areas to receive uncompacted fill, close-growing grass and other vegetation shall be mowed not to exceed 2 in. above the ground surface or existing embankment prior to foundation preparation.

4.5 Miscellaneous Structure Foundations and Debris. The Contractor shall also remove all abandoned foundations, debris, and other materials which remain after buildings or other structures have been removed by others.

4.6 Areas to be Cleared.

4.6.1 General. The entire area to be occupied by the embankment and berm, together with strips 5 feet wide contiguous thereto, and the borrow areas shall be cleared.

4.6.2 Borrow Areas. Borrow areas shall be cleared to the extent necessary to provide materials free from unsuitable matter as described in 2D-5.2. Certain stumps and areas containing masses of organic matter or other unsuitable material may be left in place upon approval of the Chief Engineer.

5. REMOVAL OF STREETS AND SIDEWALKS. Existing streets and sidewalks as indicated on the drawings shall be demolished and removed within the limits shown. Removal shall consist of removal of all concrete and asphalt pavement as well as any associated base courses. All removed materials shall be satisfactorily disposed of in accordance with 2B-6. The Contractor shall fill all holes resulting from removal operations with suitable fill.

6. DISPOSAL OF DEBRIS.

6.1 General. All debris resulting from clearing operations shall, be disposed of by removal from the site. The Contractor shall make a reasonable effort to channel merchantable material into the commercial market to make beneficial use of materials resulting from clearing operations.

6.2 Reserved.

6.3 Reserved.

6.4 Reserved.

6.5 Removal from Site of Work. The Contractor may elect to remove all or part of the debris from the site of the work. Such disposal shall comply with all applicable Federal, State, and Local laws. The Contractor shall, at his option, either retain for his own use or dispose of by sale or otherwise, any such materials of value. The Board is not responsible for the protection and safekeeping of any materials retained by the Contractor. Such materials shall be removed from the site of the work before the date of completion of the work. If debris from clearing operations is placed on adjacent property, the Contractor shall obtain, without cost to the Board, additional right-of-way for such purposes. Such material shall be so placed as not to interfere with roads, drainage or other improvements and in such a manner as to eliminate the possibility of its entering into channels, ditches, or streams. The Contractor shall submit written evidence to the Contracting Officer that he has obtained from the property owner permission for disposal of material on the owner's property. The written evidence shall consist of an authenticated copy of the conveyance under which the Contractor acquired the property rights and access thereto, prepared and executed in accordance with the laws of the State of Louisiana. If temporary rights are obtained by the Contractor, then the period of time shall coincide with SC-1 hereof, plus any extension authorized under Contract Clauses 64(b)(1). However, any delay resulting from acquisition of additional rights-of-way for alternate disposal areas will not qualify as excusable delays if suitable Board furnished disposal areas are available.

7. PAYMENT. Payment for clearing will be made at the contract lump sum price for "Clearing", which price and payment shall constitute full compensation for furnishing all plant, labor, material and equipment and performing all operations necessary for clearing the areas specified herein or indicated on the drawings, for demolition of existing streets and sidewalks, for removing and disposing of all cleared and demolished materials, and for filling holes resulting from such operations, and for placing embankment to replace material removed as a result of vegetation removal operations specified in 2B-4.4.

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SECTION 2C - EXCAVATION

1. **SCOPE.** The work covered by this section consists of furnishing all plant, labor, materials, and equipment and performing all operations necessary for stockpiling materials and for excavation in borrow areas, removal of unsuitable material from embankment foundations and all other excavation incidental to the construction of embankments and berms as specified herein or as shown on the drawings.

2. **QUALITY CONTROL.** The Contractor shall establish and maintain quality control for excavation operations to assure compliance with contract requirements, and maintain records of his quality control for all construction operations including but not limited to the following:

(1) Borrow Areas. Location, limits, allowable depths, drainage, and substitute borrow areas.

(2) Disposition of Materials. Suitability of materials and waste areas.

The original and two copies of these records of inspections and tests, as well as the records of corrective action taken, shall be furnished the Board daily. Format of the report shall be as prescribed in Special Clauses.

PART 3 - EXECUTION

3. EXCAVATION IN BORROW AREAS.

3.1 General. The rights-of-way and earth materials for constructing the work will be furnished by the Contractor.

The Contractor shall utilize borrow areas where their location and dimensions are approved by the Chief Engineer and the character of the material therein, as indicated by Board selected tests of soil samples performed by an approved independent laboratory at the Contractor's expense, is equal to or better than the Board-specified borrow material; and provided that he has submitted written evidence to the Chief Engineer that he has obtained property rights and access to the material therein. The written evidence shall consist of an authenticated copy of the conveyance under which the Contractor acquired the property rights and access thereto, prepared and executed in accordance with the laws of the State of Louisiana. Borrow pit soil borings, witnessed by a Board representative shall be furnished by the Contractor to a depth of at least 5 feet below the depth of planned excavation, with the borings located on approximate 500 foot centers throughout the ~~substitute~~ borrow pit area. Borings along the proposed borrow pit boundary shall be located no farther than 250

feet from this boundary, while maintaining the 500 foot boring spacing in all directions. Soil samples shall be classified in accordance with the Unified Soil Classification system and shall include water content determinations based on dry weight on representative soil samples, taken at each 2.5 feet of depth. These representative soil samples shall be submitted to an approved laboratory properly labeled and sealed in an airtight container to preserve the natural water content for laboratory determination. The resulting classification and water content determination and borrow pit boring logs shall be submitted to the Chief Engineer for determination of the suitability of the material for construction use. A plan view outlining the limits of the proposed borrow pit showing boring locations shall be submitted to the Chief Engineer. Cross sections shall be taken at a maximum of 200 ft. intervals over the proposed area of excavation and plotted with the proposed excavation lines superimposed. If temporary rights are obtained by the Contractor, then the period of time should coincide with SC-1, hereof, plus a reasonable time for any extension granted for completion of the work. The Chief Engineer reserves the right to approve or disapprove the use of Contractor-furnished borrow areas located in woodlands or wetlands based on the location of the areas and a determination of the overall impact the proposed excavation will have on the environment. The ~~substitute~~ borrow material shall be free of deleterious chemicals which would impede satisfactory growth of grass as provided in SECTION 2I - FERTILIZING AND SEEDING. The Contractor shall have a certified public or private agronomist test the borrow pit fill material and prescribe whatever modification may be necessary to the Fertilizing and Seeding, Section 2I of this specification so as to insure a satisfactory growth of grass. All cost associated with testing and modification to the seeding and fertilizing specification shall be borne at the Contractor's expense.

Contractor shall be solely responsible for any and all damages, claims for damages, and liability of any nature whatsoever arising from or growing out of the use of borrow areas.

Approval of location and dimensions of borrow areas shall neither relieve the Contractor from the obligation to furnish satisfactory material, nor in any way commit the Board either to acceptance of unsatisfactory material, or to responsibility for the character, quantity, or availability of material in such borrow areas.

3.1.1 The Contractor is responsible for determining that significant cultural resources are not impacted by the proposed excavation. Normally, such a determination will require a field investigation by a professional archaeologist. The field investigation consists of an inspection of the proposed borrow area, including access roads, adequate to determine if any cultural resources eligible for listing in the National Register will be impacted. The Contractor shall coordinate a written report on the results of the field investigation with the Chief Engineer and the Louisiana State Historic Preservation Officer (SHPO). A copy of the SHPO's comments shall also be furnished to the Chief Engineer. Prior to approval of the Contractor furnished borrow area, the written report shall be evaluated by the Chief Engineer to determine the adequacy of the cultural resources investigation to discharge the Board's cultural resource responsibilities. Should the Contractor believe that a field investigation of the borrow area is not necessary to determine that no cultural resources will be impacted, he shall present his justifications to the Chief Engineer and the SHPO. A copy of the SHPO's comments shall also be furnished to the Chief Engineer. Should the Chief Engineer determine that a field investigation is necessary, the above outlined procedures shall be followed.

3.2 Borrow Areas.

3.2.1 Borrow areas shall conform to requirements prescribed herein and as shown on the drawings. When the material necessary for the construction of the embankment and berms cannot be obtained from opposite stations, it shall be procured from borrow areas provided opposite the other stations or elsewhere, by haulage or otherwise, and the contract unit price for embankment and berms shall include the cost of such additional work.

where IN THE DWGS
~~Additional borrow?~~

3.3 Disposition of Materials.

3.3.1 Suitable Materials. Excavated materials which are suitable for incorporation in the embankment and berms shall either be placed directly therein, or stockpiled and subsequently used in the embankment or other fills or backfill.

3.3.2 Unsuitable Materials. Unsuitable materials, as defined in 2D-5.2, in borrow area shall not be removed from the borrow area. Any unsuitable material hauled to the jobsite or removed from the embankment foundation will be ordered wasted and shall become the property of the contractor and shall be removed from the jobsite.

4. DEGRADING EXISTING LEVEES. The existing levee shall not be degraded except as otherwise shown on the plan drawings.

5. MEASUREMENT.

5.1 Excavation. Excavation required by this section will not be measured for payment, except materials ordered wasted by the Chief Engineer.

5.2 Waste Materials. Materials ordered wasted by the Chief Engineer will be measured for payment by the cubic yard, and quantities will be determined by the average end area method. The basis of measurement will be a survey of the area prior to the excavation and a second survey of the same area after completion of the excavation.

5.3 Degrading Existing Levees. Degrading of existing levees as required by this section will not be measured for payment.

6. PAYMENT.

6.1 No payment will be made for excavation required by this section except for materials ordered wasted.

6.2 Degrading Existing Levees. Payment for degrading of existing levees will be included in the contract unit price for "Embankment (Semicompacted Fill)".

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SECTION 2D - EMBANKMENT

1. SCOPE. The work covered by this section consists of furnishing all plant, labor, equipment, and materials, except as otherwise specified in Section 2C, and performing all operations in connection with foundation preparation and enlargement of existing embankments, construction of berms and other incidental earthwork as may be necessary to complete the embankments, as shown on the drawings, and as hereinafter specified.

2. QUALITY CONTROL. The Contractor shall establish and maintain quality control for embankment construction operations to assure compliance with contract requirements, and maintain records of his quality control for all construction operations including but not limited to the following:

(1) Equipment. Type, size, and suitability for construction of the prescribed work.

(2) Foundation Preparation. Breaking surface in advance of embankment construction, and during fill placement when necessary, drainage of foundation and partially completed fill.

(3) Materials. Suitability.

(4) Construction. Layout, maintaining existing drainage, thickness of layers, and spreading and compacting.

(5) Grade and Cross Section. Crown width, crown slope, side slopes, and grades.

(6) Grade Tolerances. Check fills to determine if placement conforms to prescribed grade and design section.

(7) Settlement of Foundation. Location of settlement gages established or measurements taken to determine settlement, location of sudden failures.

(8) Slides. Location and limits; methods and equipment used where remedial work has been directed.

(9) Quantity Surveys. Accuracy and timeliness.

(10) Moisture Control. Visual soil classification and moisture content determination to conform with the limits as stated in 2D-6.1.2. For each sample submitted to a laboratory for testing, a duplicate sample suitably sealed in an airtight container, shall be submitted to the Chief Engineer's Representative.

The original and two copies of these records of inspections and tests, as well as the records of corrective action taken, shall be furnished the Board daily. Format of the report shall be as prescribed in Special Clauses.

3. EQUIPMENT.

3.1 Tamping Rollers.

3.1.1 Tractor-Drawn. Tractor-drawn tamping rollers shall consist of one or more units. Each unit shall consist of a cylindrical drum not less than 48 inches in length and not less than 40 inches in diameter. Each drum shall have staggered feet uniformly spaced over the cylindrical surfaces so as to provide approximately 3 tamping feet for each 2 square feet of drum surface. The tamping feet shall be 7 to 11 inches in clear projection from the cylindrical surface of the roller, and shall have a face area of not less than 5 nor more than 10 square inches. The drums shall be water or sand and water ballasted. The weight of the roller when fully loaded shall not be less than 1150 pounds per linear foot of drum length and when empty shall be not more than 850 pounds per foot of drum length. The Contractor will be required to vary the amount of ballast in the drums to obtain optimum compactive effort for the material being compacted. The roller shall be equipped with cleaning devices, so designed and attached as to prevent the accumulation of material between the tamping feet. These cleaning devices shall be maintained at their full length and correct alignment throughout the periods of use of the roller. The rolling units of multiple-type tamping rollers shall be pivoted on the main frame in a manner which will permit the units to adapt themselves to uneven ground surfaces and to rotate independently. The roller shall be pulled by a tractor at a speed not to exceed 3.5 miles per hour.

3.1.2 Self-Propelled. At the option of the Contractor, self-propelled tamping rollers may be used in lieu of tractor-drawn tamping rollers provided these rollers conform to the towed roller requirements for the length and spacing of tamping feet, the empty weight per foot of drum, and cleaning devices. However, self-propelled rollers exceeding the empty weight requirement may be used, provided that by substitution of tamping feet having a face area not exceeding 14 square inches, the nominal foot pressure on the tamping feet of the self-propelled roller can be adjusted to approximate the foot pressure of the towed roller for the particular working conditions. Self-propelled rollers conforming to the above requirements but with tamping feet exceeding the 14 square inch maximum face area may be approved for use provided the Contractor demonstrates to the satisfaction of the Chief Engineer by field tests performed in accordance with the provisions of 2D-3.4 that the roller can properly compact the fill without creating planes of weakness or laminations. For the self-propelled rollers in which steering is accomplished through the use of rubber-tired wheels, the tire pressures shall not exceed 40 pounds per square inch. The roller shall be operated at a speed of not more than 3.5 miles per hour.

3.2 Rubber-Tired Rollers. Rubber-tired rollers shall have a minimum of four wheels equipped with pneumatic tires. The tires shall be of such size and ply as to be capable of being operated at tire pressures between 80 and 100 pounds per square inch at a 25,000-pound wheel load. The roller wheels shall be located abreast and so designed that each wheel will carry approximately equal load in traversing uneven ground. The spacing of the wheels shall be such that the distance between the nearest edges of adjacent tires is not greater than 50 percent of the rated tire width of a single tire. The roller shall have a rigid steel frame provided with a body suitable for ballast loading so that the load per wheel may be varied, as directed by the Chief Engineer; from 18,000 to 25,000 pounds. The roller shall be towed at speeds not to exceed 5 miles per hour.

3.3 Crawler-Type Tractors. Crawler-type tractors used for spreading or compaction shall weigh not less than 20,000 pounds, shall exert a unit tread pressure of not less than 6 pounds per square inch, and shall be operated at speeds not to exceed 3.5 miles per hour.

3.4 Alternative Compaction Equipment. The Contractor may propose for use alternative types of compaction equipment not included in these specifications. The suitability of the alternative equipment must be demonstrated to the Chief Engineer by a field test conducted by and at the expense of the Contractor. The alternative compaction equipment must be capable of properly compacting the soil so that no planes of weakness or laminations are formed in the fill. The field test shall consist of compacting a minimum of three layers of an area of embankment with the alternative type equipment. Testing and inspection of the area shall then be performed by the Contractor at no additional cost to the Board. Procedures for constructing and testing the area will be provided by the Chief Engineer. Each proposed alternative type of equipment must be capable of compacting a layer of soil not less than 12-inches thick. A minimum of four complete passes over each layer of the test fill will be required for each type of alternative equipment that is allowed for use, unless in the course of constructing the test fill the Contractor is able to demonstrate that proper compaction can be obtained with fewer passes. Alternative type equipment shall be operated at speeds not to exceed 3.5 miles per hour. If sufficient previous testing has been performed on the alternative compaction equipment proposed by the Contractor to verify the suitability of the equipment to the Chief Engineer's satisfaction, the Chief Engineer may determine that the above specified field test is not required.

3.5 Miscellaneous Equipment. Scarifiers, disks, spring-tooth or spike-tooth harrows, spreaders, power tampers, and other equipment shall be types suitable for construction of embankment.

4. EMBANKMENT FOUNDATION PREPARATION.

4.1 After clearing and any required excavation of the embankment foundation, the embankment foundation and any depressions shall be broken down, where so directed, to flatten out the slopes. The entire earth surface on or against which fill is to be placed, shall be thoroughly broken to a depth of 6 inches. If for any cause, this broken surface becomes compacted in such a manner that, in the opinion of the Chief Engineer, a plane of seepage or weakness might be induced, it shall again be adequately scarified before depositing material thereon. For levee enlargement work, both the natural surface of the ground and the surface of the existing levee to be occupied by the new work shall be prepared as specified. All scarifying and breaking of ground surface shall be done parallel to the centerline of the levee. All of the foregoing work shall be completed at least 200 feet but not greater than 700 feet in advance of the embankment construction. This upper limit may be increased if so approved by the Contracting Officer.

4.2 Drainage. The foundation receiving semicompacted fill, and all partially completed fill shall be kept thoroughly drained. Drainage to areas outside the right-of-way and construction easement limits will be allowed only after the Contractor has submitted to the Chief Engineer a copy of the conveyance that he has obtained permission from the appropriate landowner(s) for such drainage. The Contractor shall be solely responsible for any and all damages, claims for damages, and liability of any nature whatsoever arising from drainage to areas outside the right-of-way and construction easement limits.

4.3 Frozen Ground. No fill shall be placed upon frozen ground.

5. EMBANKMENT MATERIALS.

5.1 General. The embankment shall be constructed of earth obtained from the borrow areas, and other required excavations as prescribed in Section 2C - EXCAVATION and to the extent shown on the drawings. The embankment shall be constructed of earth that is free from unsuitable and frozen materials as defined in 2D-5.2 and 2D-5.3. Unless otherwise specified in levee construction, material classified by the Unified Soil Classification System (as shown on the Soil Boring Legend) as gravels (GW, GP, GM) and sands (SW, SP, SM) shall not be used unless suitably blended with less pervious material.

5.2 Unsuitable Materials. Materials which are classified as unsuitable for embankment or fill material are defined as masses of organic matter, sticks, branches, roots, and other debris. Isolated pieces of wood will not be considered objectionable in the embankment provided their length does not exceed 1 foot, their cross-sectional area is less than 4 sq in.

3-5.4 Reserved.

3-6. EMBANKMENT CONSTRUCTION.

3-6.1 Semiconpacted Fill.

3-6.1.1 General. The location and extent of the semiconpacted fill is shown on the drawings. Semiconpacted fill shall not be placed in water. The materials for semiconpacted fill shall be placed or spread in layers, the first layer not more than 6 inches in thickness and the succeeding layers not more than 12 inches prior to compaction. Layers shall be started full out to the slope stakes and shall be carried substantially horizontal and parallel to the levee centerline with sufficient crown or slope to provide satisfactory drainage during construction. When the surface of any compacted layer is too smooth to bond properly with the succeeding layer, it shall be adequately scarified before the next layer is placed thereon.

3-6.1.2 Moisture Control. The Contractor shall control the moisture content of the embankment material. Material placed in the fill will have a moisture content ranging between the following limits:

<u>Type of Material</u>	<u>Moisture Content (In percent dry weight)</u>	
	<u>Maximum</u>	<u>Minimum</u>
ML	25	15
CL	32	18
CH	45	20

See explanation of

and they are distributed throughout the fill. Not more than 1 percent (by volume) of objectionable material shall be contained in the earth material placed in each cubic yard of the levee section. Pockets and/or zones of wood shall not be placed in the embankment.

5.3 Frozen Materials. Under no circumstances shall frozen earth, snow, or ice be placed in an embankment. The Chief Engineer may require the wasting of frozen material in order that construction may proceed, and such material wasted by written order of the Chief Engineer will be made by an equitable adjustment under Contract Clause 57, "Changes".

6. EMBANKMENT CONSTRUCTION.

6.1 Semicompacted Fill.

6.1.1 General. The location and extent of the semicompacted fill is shown on the drawings. Semicompacted fill shall not be placed in water. The materials for semicompacted fill shall be placed or spread in ^{horizontal} layers, the first layer not more than 6 inches in thickness and the succeeding layers not more than 12 inches in thickness prior to compaction. Layers shall be started parallel to the levee centerline with sufficient crown or slope to provide satisfactory drainage during construction. Benching into the slope of the existing embankment may be required in order to place and compact the material in horizontal layers. When the surface of any compacted layer is too smooth to bond properly with the succeeding layer, it shall be adequately scarified before the next layer is placed thereon.

6.1.2 Moisture Control. The Contractor shall control the moisture content of the embankment material. Material placed in the fill shall have a moisture content ranging between the following limits:

<u>Type of Material</u>	<u>Moisture Content (In percent dry weight)</u>	
	<u>Maximum</u>	<u>Minimum</u>
ML	25	15
CL	32	18
CH	43	20

WHAT ABOUT
ML
CL
CH

NOTE: See UNIFIED SOIL CLASSIFICATION chart for explanation of symbols and PLASTICITY CHART for classification determination. ~~It is recommended that~~ Site preparation, levee fill and compaction be accomplished in accordance with Department of the Army, Mississippi River Commission and Lower Mississippi Valley Division, Corps of Engineers Standard Specifications for Levee Construction.

shall } A Soil Bond
be incorp. in } Levee shall
the drawings. } be incorp. in
the drawings.

The Contractor shall perform the necessary work in moisture control to bring the borrow material within the moisture content range specified above. If the borrow material is too wet, it shall either be stockpiled and allowed to drain before it is placed in the embankment cross sections and/or the wet material shall be processed by disking and harrowing, if necessary, until the moisture content is reduced sufficiently. If the borrow material is too dry, it shall either be prewet in the borrow area, or sufficient moisture shall be uniformly distributed in each layer before rolling. No additional payment will be made for any moisture control required in this subparagraph.

6.1.3 Compaction. When the moisture content and conditions of the spread layers are satisfactory, each layer shall be compacted by any of the following methods at the option of the Contractor:

(1) Tamper-Type Roller. Four complete passes over each layer will be required. If tamping rollers are used in tandem, not more than two rows will be permitted, and in such case, one trip of the tandem rollers over any surface will be considered as two passes. When tamping rollers are used in tandem, the tamper foot spacing shall be offset so that the circumferential rows on the rear drums are in line with the midpoint of the circumferential rows of the forward drums. Each pass of the tamping roller shall overlap the preceding or adjacent pass by not less than 1.0 foot.

(2) Rubber-Tired Roller. Two complete passes over each layer will be required.

(3) Crawler-Type Tractor. Three complete passes over each layer will be required. The tractor will not be considered to be compacting while spreading materials.

6.1.4 Definition of Pass. A pass shall consist of one complete coverage of the surface of a layer by the treads of the roller, tractor, or other compacting equipment. Portions of the embankment which the compacting equipment cannot reach for any reason shall be compacted by an approved method to the density at least equal to that of the surrounding embankment.

6.1.5 Additional Compaction. If, in the opinion of the Contracting Officer, the desired compaction of any portion of the embankment cannot be secured by the minimum number of passes specified, additional complete passes shall be made over the surface area of such designated portion until the desired compaction has been obtained, and an equitable adjustment in the contract price and time will be made.

6.2 Dressing. The entire embankment shall be brought to not less than the prescribed design cross section at all points. Unreasonable roughness of surface shall be dressed out to permit turving operations.

7. CROSS SECTIONS AND ZONING OF MATERIALS.

7.1 Embankment Sections. Unless otherwise specified, the dimensions and slopes shall conform to the applicable cross sections shown on the drawings.

7.2 Zoning of Materials for Levee Construction. In general, the levee section including berms shall be homogeneous; however, where materials of varying permeabilities are encountered in the borrow areas, the more impervious material shall be placed toward the floodside slope, and the more pervious material toward the protected side slope.

7.3 Berms. Berms shall be constructed at the locations and to the grade and cross section shown on the drawings.

8. RESERVED.

9. GRADE TOLERANCES. All embankments shall be constructed to the design grade and cross section shown on the drawings. For semicompacted fill, at all points, a tolerance of five-tenths of one foot above the prescribed design grade and cross section shown will be permitted in the final dressing provided that any excess material is so distributed that the crown of the levee drains, there are no abrupt humps or depressions in surfaces or bulges in the width of the crown, and the side slopes are uniform. Any partial fill or temporarily stockpiled material placed within the design section shall not exceed the design grade or design slopes of the embankment by more than 1 foot, and shall have side slopes not steeper than 1V on 3H.

10. SETTLEMENT OF FOUNDATION.

10.1 In clearly established cases of sudden failure of the foundation, either where no provision has been made for the measurement of settlement or where settlement measuring devices have been installed, but the nature of settlement is such as to destroy their utility, the settlement shall be determined by borrow area measurement. The borrow area embankment ratio shall be measured in adjacent embankment where no failures have occurred.

10.2 Where settlement of the foundation develops to such an extent as to make it inadvisable, in the opinion of the Chief Engineer to continue to add material, and advisable in his opinion, to postpone until a considerably later date all attempts to bring that portion of the embankment to full grade and cross section, the Chief Engineer shall have the right to omit further work on the portion of the embankment and to accept it as completed.

11. SLIDES. Should sliding occur in any part of the embankment during its construction, or after its completion, but prior to its acceptance, the Contractor shall, upon written order

of the Chief Engineer, either cut out and remove the slide from the embankment and then rebuild that portion of the embankment, or construct a stability berm of such dimensions, and placed in such manner, as the Chief Engineer shall prescribe. In case the slide is caused through fault of the Contractor, the foregoing operations shall be performed at no additional cost to the Board. In case the slide is not the fault of the Contractor, the material ordered removed will be paid for as specified in 2C-7.1, and the material replaced. Fill material for stability berms will be paid for as specified in 2D-13 in addition to any payment due the Contractor for materials previously placed. The method of slide correction will be determined by the Chief Engineer.

12. MEASUREMENT.

12.1 Embankment.

12.1.1 Unless otherwise specified, semicompacted fill and required fill and backfill materials of any description specified in this section will be measured for payment by the cubic yard, and quantities will be determined by the average end area method. The basis for the measurement will be cross sections of the areas to be filled taken prior to clearing including the vegetation removal work specified in 2B-4.4, and the theoretical design cross sections from the grades, side slopes, crown widths, and other dimensions shown on the drawings or specified herein, with the following limitation:

(1) Material included in the above-grade tolerance specified in ^{2D-11} 2D-11 will not be measured for payment.

(2) The basis of measurement of fill placed by reason of soft material in the foundation being forced outward from the section will be a survey of the area taken prior to the filling operations and a second survey of the same area after completion of the filling operations.

13. PAYMENT.

13.1 Embankment. Payment for all semicompacted material placed as required in embankments and berms will be made at the contract unit price per cubic yard for "Embankment, (Semicompacted Fill)", which price and payment shall constitute full compensation for furnishing all plant, labor, equipment and material, except earth material, and performing all operations necessary for foundation preparation, and placing and compacting the material, and moisture control.

13.2 Degrading Existing Levees. Payment for degrading existing levees as required by Section 2C will be included in the contract unit price for "Embankment (Semicompacted Fill)".

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SECTION 2E - STRUCTURAL EXCAVATION AND BACKFILL

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all plant, labor, materials, equipment, and performing all operations necessary for structural excavation, structural backfill, excavation and backfill of an inspection trench, and all incidental work as specified or as shown on the drawings.

2. QUALITY CONTROL. The Contractor shall establish and maintain quality control for excavation operations to assure compliance with contract requirements and maintain records of his quality control for all construction operations including but not limited to the following:

(1) Equipment. Type, size and suitability for construction of the prescribed work.

(2) Construction. Layout, maintaining existing drainage, moisture control, thickness of layers, spreading and compacting.

(3) Placing and compacting of structural backfill.

2.1. The original and two copies of these records of inspections and tests, as well as the records of corrective action taken, shall be furnished the Board daily. Format of the report shall be as prescribed in Special Clauses.

PART 2 - PRODUCTS

3. EQUIPMENT.

3.1 Hand Tampers. Hand tamping or other approved methods shall be used for compaction of fill near structures where vehicular equipment cannot be used. These hand tampers should be power driven, hand operated type.

3.2 Alternative Compaction Equipment. The Contractor may propose for use alternative types of compaction equipment not included in these specifications. The suitability of the alternative equipment must be demonstrated to the Chief Engineer by a field test conducted by and at the expense of the Contractor. The alternative compaction equipment must be capable of properly compacting the soil so that no planes of weakness or laminations are formed in the backfill. The field test shall consist of compacting a minimum of three layers of an area of embankment with the alternative type equipment. Testing and inspection of the area shall then be performed by the Contractor at no additional cost to the Board. Procedures for constructing and testing the area will be provided by the Chief Engineer. Each proposed alternative type of equipment

must be capable of compacting a layer of soil not less than 12-inches thick. A minimum of four complete passes over each layer of the test fill will be required for each type of alternative equipment that is allowed for use, unless in the course of constructing the test fill the Contractor is able to demonstrate that proper compacting can be obtained with fewer passes. Alternative type equipment shall be operated at speeds not to exceed 3.5 miles per hour. If sufficient previous testing has been performed on the alternative compaction equipment proposed by the Contractor, the Chief Engineer may determine that the above-specified field test is not required to verify the suitability of the equipment.

PART 3 - EXECUTION

4. RESERVED.

5. STRUCTURAL EXCAVATION AND BACKFILL.

5.1 The Contractor shall make all excavations required for the construction of the floodwall, for the inspection trench, for gate structures and for removal of obstructions that prevent driving all piles to the required penetration. The Contractor shall design and provide all necessary shoring, bracing, sheeting, underpinning, and supports as may be required for the work. The Contractor shall also provide sumps, pumps, or ditches which may be required to dewater the excavations. Suitable material from required structure excavation shall be used in the structure backfill. Material classified by the Unified Soil Classification System (as shown on the Soil Boring Legend), as gravels (GW, GP, GM), and sands (SW, SP, SM) shall not be used unless suitably blended with less pervious material.

5.2 Structural Backfill. The Contractor shall backfill all excavations including the inspection trench to final grades. Structure backfill which is placed within 2 feet of the vertical face of piling, I-wall or of inverted T-wall base shall be placed in successive layers not to exceed 8 inches and be fully compacted to 90 to 95 percent maximum density as determined by ASTM D 698. Material for structure backfill shall be obtained from the structure excavation or borrow area and shall be suitable material. Backfill shall not be placed against any concrete which is less than 21 days old.

5.3 Unsuitable Materials. Unsuitable structural backfill is defined as material containing organic matter, sticks, branches, roots, brick, concrete, rock, sand or other debris.

5.4 Inspection Trench.

5.4.1 The purpose of the inspection trench is to (1) accurately locate existing utilities; (2) discover undetected utilities; (3) and locate any cultural resources. The Contractor

Contractor should be incorporated to the drawings
Should be incorporated to the drawings
Borrow Area

shall cease work and notify the Chief Engineer if buried cultural remains are uncovered during construction. The Contractor shall remove all unsuitable timbers, rocks, trash, debris, etc., encountered during the excavation of the inspection trench at no cost to the Board. The Contractor shall notify the Contracting Officer 7 days in advance of beginning excavation on the inspection trench.

5.4.2 The inspection trench shall be excavated along the centerline of the steel sheet piling alignment to the depths and locations as shown on the drawings. ~~also in the drawings~~ S3

5.4.3 The Contractor shall shore the inspection trench around all uncovered utilities so that work can be performed. The same requirements for compaction and material used for structural backfill shall be used for the trench fill. Safety guards shall be provided around all open trenches. A maximum of 20 linear feet of open inspection trench is allowed at any time. If no utilities are found, the Contractor shall immediately backfill the trench and compact to final grades as specified in accordance with 2E-5.2.

5.5 Dressing. The backfill shall be brought to not less than the prescribed design cross section at all points. Unreasonable roughness of surface shall be dressed out to permit fertilizing and seeding operations.

6. MEASUREMENT AND PAYMENT.

6.1 Structural Excavation and Backfill. Excavation and backfill for the floodwall and gate structures will not be measured for payment. Payment for structural excavation and backfill will be made at the contract lump sum price for "Structural Excavation and Backfill", which price and payment shall include all cost of excavation, backfill, and shoring for the structure and all other costs incident thereto.

6.2 Inspection Trench. The inspection trench will not be measured for payment. Payment will be included in the contract lump sum price for "Structural Excavation and Backfill", which price shall include all costs of excavation, handling, filling, compacting and all costs incidental thereto.

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SECTION 2F - PRESTRESSED CONCRETE PILES

PART 1 - GENERAL

1. **SCOPE.** The work covered by this section consists of furnishing all plant, equipment, labor, and materials, and performing all operations in connection with the manufacture and installation of precast concrete bearing piling in accordance with these specifications and applicable drawings.

2. QUALITY CONTROL.

2.1 **General.** The Contractor shall establish and maintain quality control for pile manufacture and driving operations, assure compliance with contract specifications and maintain records of his quality control for all construction operations including, but not limited to the following:

(1) Record of tests for gradation of aggregate and compressive strength of concrete as required, including proportioning of mix.

(2) Setting and bracing of forms and checkout just prior to concrete placement, including accurate placement of reinforcing steel.

(3) Casting, handling and storage of precast, prestressed piling; records of prestressing tension strands.

(4) Curing (method and duration).

(5) Driving (pile hammer and rate of operation; final positioning; tip and top elevations; uplift and vertical tolerances after driving; pulled piles and re-driving; removal and disposal of damaged piles; location and elevation of any obstruction encountered and action directed by Contracting Officer).

(6) Recording number of blows per foot for the full length of each pile.

2.2 **Reporting.** The original and two copies of these records and tests, as well as the records of corrective action taken, shall be furnished the Board daily. Format of the report shall be as prescribed in Special Clauses.

2.3 **Applicable Publications.** The following publications, referred to thereafter by basic designation only, form a part of this specification to the extent indicated by reference thereto:

2.3.1 American Society for Testing and Materials (ASTM Standards).

A 82-79	Cold-Drawn Steel Wire for Concrete Reinforcement
A 416-80	Uncoated Seven-Wire Stress-Relieved Steel Strand for Prestressed Concrete
C 31-84	Making and Curing Concrete Test Specimens in the Field
C 39-83b	Compressive Strength of Cylindrical Concrete Specimens
C 150-84	Portland Cement
C 260-77	Air-Entraining Admixture for Concrete
C 494-82	Chemical Admixtures for Concrete

2.3.2 Prestressed Concrete Institute.

PCI Design Handbook for Precast and Prestressed Concrete

PCI Manual MNL116, Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products

2.3.3 American Concrete Institute.

SP-66 ACI Detailing Manual

2.4 Submittals.

2.4.1 Shop Drawings. Shop drawings to demonstrate compliance with driving equipment installation and installed pipes with contract documents shall be submitted to the Contracting Officer for review. Drawings shall include shop erection details, build-up details, and special embedded or attached lifting devices. Drawings also shall clearly indicate pick-up and support points for piles. Reinforcing steel details shall conform to ACI SP-66.

2.4.2 Records. A complete and accurate record of all driven piles shall be furnished by the Contractor. The record shall include the pile number or identification, location, size, length, elevation of tip and top of pile, and the number of blows required for each foot of penetration throughout the entire length of the pile, and the number of blows per inch for the last 18 inches of penetration. The record shall include the type and size of the hammer, the rate of operation, the type and

dimensions of driving helmet, and the cap-block and pile cushion used. Any unusual occurrence during driving of the pile shall be recorded and reported to the Contracting Officer. *Chief Engineer*

PART 2 - PRODUCTS

3. TYPES AND PROPERTIES.

3.1 Types. Piles shall be uniformly square in section, of size 12-inch by 12-inch. Corners shall be chamfered 3/4-inches or, in lieu of chamfering, may be rounded to a 1-inch radius.

3.2 Properties. Cement may be Type II or Type I conforming to ASTM C 150 but total tricalcium aluminate content for Type I shall not exceed 8.0 percent. If fly ash is used, it will be limited to a maximum of 25% by absolute volume of the total cementitious materials. The Contractor shall be responsible for the design of the concrete mix and for meeting the strength requirements. However, the mixes and curing operation shall be submitted for approval. The design f'_c shall be 5,000 psi (pounds per square inch) at 28 days such or earlier age as concrete is to receive its full service load or maximum stress. Prior to transfer of prestressing force to concrete, f'_c shall be 4,000 psi. The minimum ultimate compressive strength of concrete f'_c shall be determined by the average computed compressive strength from tests of three standard 6 by 12 inch cylinders tested in accordance with the requirements of ASTM C 39. Each test shall include one test cylinder made at each of three different times during each pour in accordance with the provisions of 2F-4.5. All cylinders will be made and tested by the Contractor and witnessed by the Chief Engineer's representative. Facilities shall be made available to the Chief Engineer's representative for making any additional test cylinders required by the Chief Engineer. Concrete test cylinders shall be cured at the same location, under identical conditions, and by the identical method used to cure the piles cast of the same concrete placements from which the samples were taken.

3.3 Admixtures. Chemical admixtures if used in the concrete mixtures shall conform to ASTM C 494 and shall be used at no additional cost to the Government. Air-entraining admixtures shall conform to ASTM C 260. Calcium chloride or admixtures containing chlorides shall not be used.

4. MANUFACTURE.

4.1 General. Except as otherwise specified herein the piles shall be controlled, made and placed, in accordance with the latest editions of the provisions of Article 2.4.33 of the Standard Specification for Highway Bridges of the American Association of State Highway Officials, 1977 Edition (with yearly revisions and additions to date).

4.2 Reinforcing. The prestressed reinforcing system shall be 7-wire, 1/2", stress-relieved steel strands conforming to the requirements of ASTM A 416, grade 250. Initial tension in 1/2" strands before release shall be 25,200 pounds. The substitution of ASTM A 416, grade 270 strands is an allowable substitution for grade 250 strands provided complete design criteria on initial tension and pickup points is submitted to the Contracting Officer for approval. Prestress force shall be determined by measuring hydraulic jack pressure with a calibrated pressure gage or by the use of an accurately calibrated dynamometer. The prestress force shall be checked by accurately measuring tendon elongation between 1,000-pound and 25,200-pound applied prestress force. Elongation requirements shall be obtained from load-elongation curves for the steel used and the applied prestress force shall be computed from the measured elongation. If the difference between the computed force and the measured jack force exceeds 5 percent, the cause of the discrepancy shall be ascertained and corrected. The prestressing strands shall be cut prior to reducing the temperature of the steam if steam curing is used. Spiral reinforcing shall be cold-drawn steel wire conforming to ASTM A 82. Reinforcing other than that required for prestressing and spiral reinforcement shall conform to Section 3B.

4.3 Forms. Forms shall be arranged to provide ample working room and easy access for carrying out all operations required for the proper placing, consolidation, and finishing of the concrete for the piles. The design of the forms shall be such that removal can be accomplished without damage to the completed piles. Forms shall remain in place until piles are removed from the casting bed.

4.3.1 The use of steel forms on concrete founded casting beds is required. Outer forms shall enclose all except the top horizontal surface. The side forms may have a maximum drift on each side not exceeding 1/4" per foot. The top of the concrete casting shall be given a uniformly smooth finish to match the finish surface of the formed sides.

4.4 Tolerances. Pile ends shall be plane surfaces and perpendicular to the axis of pile with a maximum tolerance 1/8" per foot transversely. The maximum sweep (deviation from straightness measured along two perpendicular faces of the pile, while not subject to bending forces) shall not exceed 1/8" in any 10' of its length, 3/8" in any 40' or 3/16" x (total length in feet)/20 feet at any point along the length of the pile.

4.5 Casting. Piles shall be cast on level, tight, platforms, constructed to prevent settlement during the casting and curing operations. Piling shall be cast in a horizontal position. Casting in tiers will not be permitted. When casting is once started, it shall be carried on as a continuous operation until the pile is completed. All concrete shall be thoroughly compacted by internally vibrating, spading and rodding during the

placing operation and it shall be thoroughly worked around the reinforcement and into the corners of the forms. The intensity of vibration shall be sufficient to cause the concrete to flow and settle into place. Vibration shall be applied uniformly over the length of the pile and shall be of sufficient duration to insure thorough compaction of the concrete. Spading and rodding during the placing operation shall supplement the vibration. Surfaces shall be free from detrimental porosity or honeycomb. Small areas of honeycomb which are purely surface in nature, extending to a depth of no more than 1 inch, may be repaired in the manner directed. Honeycomb extending to the plane of reinforcing will be cause for rejection. Each pile shall be marked to indicate pick-up points, date of casting and 1-foot intervals to permit counting of number of blows per foot of driving for the total length of the pile. During the time of casting each set of concrete piles, the Contractor shall make a minimum of nine standard 6-inch by 12-inch concrete test cylinders in accordance with the provisions of ASTM C 31. A minimum of three test cylinders shall be made at three times during each placement; the first time early in the placement, the second time in the middle of the placement, and the third time near the end of the placement. The use of special embedded or attached lifting devices shall be subject to approval of the Chief Engineer.

4.6 Curing. Prior to the start of the curing operations, the methods and details of curing shall be submitted for approval by the Chief Engineer. All piles shall be cured in accordance with Section 4 of PCI Manual MNL116. Curing shall be continued until the concrete has attained a minimum compressive strength of 3,500 psi as determined by tests on the concrete test cylinders hereinbefore specified. Concrete test cylinders shall be cured at the same location, under identical conditions and by the identical method used to cure the piles cast of the same concrete placement from which the samples were taken.

4.7 Storage, Handling, and Transportation.

4.7.1 The methods used for storage and handling of the piles shall be such that the piling will not be subjected to excessive stress, cracking, spalling or other injury. The compressive cylinder strength at transfer of prestressing force shall be not less than 3,500 psi as indicated by test cylinders. The piling may be removed from the casting bed to nearby storage anytime after transfer of stress provided the maximum length does not exceed 74 feet for 2-point pickup or 54 feet for 1-point pickup. Piling shall be held at the plant until one of the following criteria is met: Ten days after the specified minimum 28-day compressive strength is attained or 14 days after casting, provided that the specified minimum 28-day compressive strength has been attained. Piles which are damaged curing, handling or driving to the extent that they are rendered unsuitable to be incorporated in the work shall be removed from the site of work by the Contractor at no cost to the Board.

4.7.2 In general, piles shall be lifted by means of a suitable bridle or slings attached to the pile at the marked pickup points. The use of other pickup points or any other type of pickup shall be subject to approval of Chief Engineer.

4.7.3 Storage areas for prestressed members shall be stabilized, and suitable foundations shall be provided, so differential settlement or twisting of members will not occur. Stacked members shall be separated and supported by battens placed across the full width of each bearing point. Battens shall be arranged in vertical planes at a distance not greater than the depth of the member from designated pickup points. Battens shall not be continuous over more than one stack of precast units. Stacking of members shall be such that lifting devices will be accessible and undamaged. The upper members of a stacked tier shall not be used as storage areas for shorter members or equipment.

4.7.4 In transporting members by truck, railroad car or barge, provisions shall be made for supporting the members as described above, except battens can be continuous over more than one stack of units, with adequate bracing to insure their maintaining the vertical position and damping of dangerous vibrations. Trucks with double bolsters are generally satisfactory provided the members are fully seated on the outer bolsters at not more than 3 feet or the depth of the member from the end and the inner bolster is not more than 8 feet from the end of the member or the designated pickup point. Adequate padding material shall be provided between tie chains or cables to preclude chipping of concrete. Any noticeable indication of lateral deflection or vibration during transportation shall be corrected by rigid bracing between members or by means of lateral trussing.

PART 3 - EXECUTION

5. PLACING.

5.1 Piles shall be driven as accurately as practicable in the correct locations, true to line both laterally and longitudinally and to the vertical or batter lines, all as indicated in the drawings. A lateral deviation from the correct location at the cut-off elevation of not more than 3 inches will be permitted. A variation in slope of not more than 1/4 inch per foot of longitudinal axis will be permitted. The correct relative position of group piles shall be maintained by the use of templates or by other approved means. Any pile driven out of correct location shall be pulled and redriven by the Contractor at no additional cost to the Board.

6. DRIVING. Piles shall be driven by an approved single-acting steam or air hammer of a size and type suitable for the work. The weight of the moving parts of the hammer shall be at least 2/3 the weight of the pile to be driven. The hammer

shall be operated at all times at the steam or air pressure and at the speed recommended by the manufacturer. Boiler or compressor capacity shall be sufficient to operate the hammer continuously at full rated speed. Piles shall be protected during driving by a cushion and cap of approved design. Pile drivers shall have firmly supported leads extending to the lowest point the hammer must reach to maintain the hammer in proper alignment at all times. A pile shall not be driven until it is approved for driving. Approval will be based on the condition of curing and on its compressive strength as indicated by the test cylinders. Each pile shall be driven continuously and without voluntary interruption until the required depth of penetration has been attained or until the maximum permissible blows per foot of 75 is reached, whichever occurs first. Deviation from this procedure will be permitted only in case the driving is stopped by causes which could not reasonably have been anticipated.

Splicing of concrete piles will not be permitted. Any pile that cannot be driven to the required depth because of an obstruction shall, as directed by the Chief Engineer, be pulled or be cut off perpendicular to the axis of the pile and used or abandoned. If the pile is to be used, cutting methods shall not damage the portion of the pile or reinforcement to be left in place. If the pile is abandoned, it shall be cut off, or removed and another pile driven adjacent thereto, as directed by the Chief Engineer.

Any holes which remain as a result of pulling operations shall be filled to within 3 feet of the ground surface with a thick tremie placed slurry consisting of 1 part Bentonite and 3 parts Portland cement. The upper 3 feet of the hole shall be filled with earth. The Contractor shall make observations to detect any uplift of piles already driven and uplifted piles shall be backdriven to the original penetration without additional cost to the Board. Piles shall not be driven within 100 feet of concrete less than seven days old nor within 30 feet of concrete less than 28 days old. The Contractor shall provide every facility for the Chief Engineer to inspect and record data relative to pile driving operations. This record shall, as a minimum, include blows per foot of pile penetration; final tip elevation; and blows per foot prior to seating.

6.1 After piles have been acceptably driven, the Contractor shall remove the driving heads from the piles by an approved means which will not damage the anchorage reinforcement in the piles.

7. DAMAGED AND MISPLACED PILES. Any pile which is cracked or broken because of internal defects or by improper handling or driving, or which is otherwise injured so as to impair it for its intended use, or any pile driven out of proper location, shall be removed and replaced. All work of removal and cost of replacement shall be borne by the Contractor at no additional expense to the Board. The Chief Engineer may require the Contractor to pull certain selected piles after driving for

*Some How counts
for 14" at
RR work?*

ok

test and inspection to determine the condition of the piles. Any pile so pulled and found to be damaged to such extent as, in the opinion of the Chief Engineer would impair its usefulness in the completed structure, shall be removed from the site of the work and the Contractor shall furnish and drive a new pile to replace the damaged pile. Piles pulled and found to be sound and in a satisfactory condition shall be redriven. Any holes which remain as a result of pulling operations shall be filled as specified in paragraph 6 above.

8. MEASUREMENT. Precast prestressed concrete piles will be measured for payment on the basis of lengths along the axis of the pile in place below the cut-off elevation and shall be limited to the lengths as shown on the drawings. Pile lengths will be measured to the nearest tenth of a foot. The portion of any pile driven below the tip elevation shown on the drawings will not be measured for payment unless overdriving is directed by the Chief Engineer. Pulled piles shall be measured for payment on the basis of lengths along the axis of the pile pulled above the cut-off elevation. Redriving of piles will be measured in accordance with the provisions stated hereinabove for originally driving the piles. Cut offs shall be measured for payment on the basis of total length minus driving head length provided that this length is not greater than the difference between the total length of piles shown on the plans for that location and the length of piles driven below the point of cut off.

9. PAYMENT.

9.1 Driven Piles. Payment for each concrete pile acceptably driven will be made at the contract price per linear foot for "Piling, Concrete Precast Prestressed" which price shall include all costs incidental to furnishing, driving, removing driving heads, backdriving and inspecting the concrete piles.

9.2 Pulled Piles.

9.2.1 Each concrete pile pulled at the direction of the Chief Engineer for inspection and found to be in good condition, will be paid for at the contract unit price for furnishing and driving the pile in its original driven position, plus 50 percent of the contract unit price for furnishing and driving which shall constitute payment for pulling. Payment for a pulled pile shall include backfilling the pile hole if required. Undamaged pulled piles when redriven acceptably will be paid for at 50 percent of the contract unit price for furnishing and driving the measured length of piles redriven, which price and payment shall constitute payment for redriving only. Pulled piles which are damaged through no fault of the Contractor shall be replaced by a new pile which will be paid for at the contract unit price for the length acceptably driven.

9.2.2 When a pile is pulled for inspection and found to be damaged due to Contractor negligence, no payment will be made for originally furnishing and driving such pile or for the operation of pulling and it shall be replaced by a new pile which will be paid for at the contract unit price for the length acceptably driven.

9.2.3 When a pile is driven but not acceptably placed or driven out of alignment and pulled at the direction of the Chief Engineer no payment will be made for either originally furnishing and driving such pile or for the operation of pulling. When the pile is acceptably redriven at the direction of the Chief Engineer it will then be paid for at the contract unit price.

9.3 Cutoffs. Payment will be made for the measured cutoff portion of any concrete pile at the rate of 50 percent of the contract unit price for furnishing and driving the pile and no other payment will be made for such cutoff.

END OF SECTION

*Need Pile Test specs } Soils report indicated
if piles to be test loaded } need for pile load
test
Plans and specs do not indicate
pile load test.
Do not know what factor of safety
for which pile tip elevations
were selected.*

*ES=2 w/pile test
or FS=3 w/o pile
test?*

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SECTION 2G - STEEL SHEET PILING

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SECTION 2G - STEEL SHEET PILING

PART 1 - GENERAL

1. **SCOPE.** The work covered by this section consists of furnishing all plant, equipment, labor and materials, and performing all operations in connection with the installation of Contractor furnished steel sheet piling in accordance with these specifications and applicable drawings.

2. **APPLICABLE PUBLICATIONS.** The following American Society for Testing and Materials (ASTM) standards of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto:

A 328-81 Steel Sheet Piling

3. SUBMITTALS.

3.1 Equipment Descriptions. The Contractor shall submit complete descriptions of pile driving equipment, including hammers, extractors, protecting caps and other appurtenances to the Chief Engineer for approval prior to commencement of work.

3.2 Certificate. The Contractor shall furnish the Chief Engineer a certificate showing that piling furnished has the required interlock strength as determined by test results of two representative test specimens, approximately 3 inches long, per sheet. The certificate shall indicate piling type, dimensions and section properties. Piling shall not be delivered to the site prior to the receipt by the Contractor of a written approval from the Chief Engineer.

4. QUALITY CONTROL.

4.1 General. The Contractor shall establish and maintain quality control for pile driving operations to assure compliance with contract specifications and maintain records of his quality control for all construction operations including, but not limited to, the following:

(1) Driving (pile hammer and rate of operation); final position; tip and top elevations uplift and vertical tolerances after driving; pulled piles and re-driving; removal and disposal of damaged piles; location and elevation of any obstruction encountered and action directed by Chief Engineer.

4.2 Reporting. The original and two copies of these records and tests, as well as the records of corrective action taken, shall be furnished the Board daily. Format of the report shall be as prescribed in Special Clauses.

PART 2 - PRODUCTS

5. MATERIALS. Steel for sheet piling shall conform to the requirements of ASTM A 328. Sheet piling, including special fabricated sections, shall be of the type indicated on the drawings, have nominal web thickness of not less than 3/8-inch and be of a design such that when in place they will be continuously interlocked throughout their entire length. All sheet piling shall be provided with standard pulling holes located approximately 4 inches below the top of the pile, unless otherwise shown or directed. Welded connections shall conform to the requirements of Section 5B - METALWORK FABRICATION, MACHINE WORK AND MISCELLANEOUS PROVISIONS. Piling shall have the properties equivalent to those listed in the following table:

PROPERTIES OF RECOMMENDED SECTIONS

Type of Section	Nominal Web Thickness (Inches)	Modulus Per Lin Ft of Wall of Wall (In) ³	Weight Per Sq Ft of Wall (Lbs)	Weight Per Lin Ft of Pile (Lbs)	Minimum Interlock Strength (Lbs/Lin in)
PZ-27	3/8	30.2*	27	40.5	
PSA-23	3/8	2.4	23	30.7	12,000

Approved standard fabricated sections may be substituted for Type PSA-23 sheet piling.

*Minimum acceptable modulus per line.ft. of wall = 20.1 in³ (ASTM A382 Materials)

PART 3 - EXECUTION

6. INSTALLATION.

6.1 Placing and Driving.

6.1.1 Placing. Piling shall be carefully located as shown on the drawings or as directed by the Chief Engineer. Piles shall be placed in a plumb position with each pile interlocked with adjoining piles for its entire length, so as to form a continuous diaphragm throughout the length of each run of wall. Interlocks shall be properly engaged with the thumb of each pile gripped by the thumb and finder of the adjacent pile. All piles shall be placed as true to line as possible. Suitable temporary wales or guide structures shall be provided to insure that the piles are driven to correct alignment.

6.1.2 Driving. All piles shall be driven to the depths shown on the drawings and shall extend to the elevation indicated for the top of piles. A tolerance of 1-1/2 inches above or below the indicated top elevation will be permitted. Piles shall be driven by approved methods in such manner as not to subject the piles to serious damage and to insure proper interlocking

throughout the length of the piles. Pile hammers shall be maintained in proper alignment during driving operations by use of suitable leads or by guides attached to the hammer. A protecting cap shall be employed in driving, when required, to prevent damage to the tops of piles. All piles shall be driven without the aid of a water jet, unless otherwise authorized. Adequate precautions shall be taken to insure that piles are driven plumb. If at any time the forward or leading edge of the piling wall is found to be out of plumb in the plane of the wall, the piles already assembled and partly driven shall be driven to full depth and the Contractor shall provide and drive tapered piles to interlock with the out of plumb leading edge or take other corrective measures to insure the plumbness of succeeding piles. The maximum permissible taper for any tapered pile will be one-eighth of an inch per foot of length. Each run of piling shall be driven to grade progressively from the start and no pile shall be driven to a lower grade than those behind it in the same run except when the piles behind it cannot be driven deeper. If the pile next to the one being driven tends to follow below final grade, it may be pinned to the next adjacent pile. Should obstructions render it impracticable to drive a pile to the specified penetration, the Contractor shall make such changes in design alignment of the pile structure as may be deemed necessary by the Chief Engineer to insure the adequacy and stability of the structure. Payment for the additional labor and materials necessitated by such changes will be made by at the applicable contract prices. Piles driven out of interlock with adjacent piles or otherwise damaged shall be removed and replaced by new piles at the Contractor's expense. Piles shall not be driven within 100 feet of concrete less than 7 days old nor within 30 feet of concrete less than 28 days old.

6.1.3 Emergency Locking System on Pile Driving Head. All pile driving equipment shall be equipped so as to prevent piles from falling when a single or multiple power failure occurs after the pile driving head is attached to the pile. The jaws of vibratory hammers shall be equipped with devices such that upon loss of hydraulic pressure, the jaws will not release the pile.

6.2 Cutting and Splicing. Piles extending above grade which cannot be driven deeper shall as directed, be cut off to the required grade. The Contractor shall trim the tops of piles excessively battered during driving, when directed to do so, at no cost to the Board. Cut-offs shall become the property of the Contractor and shall be removed from the work. Piles driven below the elevations indicated for the top of piles and piles which because of damaged heads have been cut off to permit further driving, and are then too short to reach the required top elevation, shall be extended to the required top elevation by welding an additional length, when directed, without cost to the Board. If directed by the Chief Engineer piles shall be spliced as required to drive them to depths greater than shown on the drawings while maintaining the required top

elevation. Should splicing of piles be necessary, the splice shall be made by an approved butt weld making full penetration of the web. Piles adjoining spliced piles shall be full length piles unless otherwise authorized by the Chief Engineer.

All steel sheet piling to be spliced shall be delivered on site in full lengths and cut for splicing only after delivery. Steel sheet pile splices shall be made from only those portions of the originally uncut pile. Welding of splices shall conform to the requirements of Section 5B, METALWORK FABRICATION, MACHINE WORK, AND MISCELLANEOUS PROVISIONS. Ends of pilings to be spliced together shall be squared before splicing to eliminate dips or camber. Pilings shall be spliced together with concentric alignment of the interlocks so that there are no discontinuities, dips, or camber at the abutting interlocks. Spliced sheets shall be free sliding and able to obtain the maximum swing with contiguous sheets. The Contractor shall cut holes in the piles for bolts, rods, drains, or utilities at locations and of sizes shown on the drawings or as directed. All cutting shall be done in a neat and workmanlike manner. Bolt holes shall be drilled or burned and reamed in place by approved methods which will not damage remaining metal. Holes, other than bolt holes, shall be reasonably smooth and of proper size for rods or other items to be inserted. Pile splice extensions shall be at least 6 inches in height.

6.3 Inspection of Driven Piling. The Contractor shall inspect the interlocks of the portion of driven pilings that extend above ground. Pilings found to be out of interlock shall be removed and replaced at the Contractor's expense.

6.4 Pulling and Re-driving. The Contractor may be required to pull certain selected piles after driving, for test and inspection, to determine the conditions of the piles. Any pile so pulled and found to be damaged to such extent as would impair its usefulness in the structure shall be removed from the work and the Contractor shall furnish and drive a new pile to replace the damaged pile. Piles pulled and found to be in a satisfactory condition shall be redriven.

6.5 Void Backfill. Where voids adjacent to the steel sheetpiling are induced by the pile driving operation, the Contractor shall pump out all seepage and rain water and backfill with a sand-bentonite slurry. The slurry shall consist of one part bentonite to three parts sand mixed with enough water to produce a slurry liquid enough to thoroughly fill voids to the same elevation as the natural ground. The sand portion of the slurry shall contain less than 20 percent of material passing the No. 200 sieve and have at least 90 percent of its coarse fraction passing the No. 4 sieve wherein the coarse fraction is defined as material larger than the No. 200 sieve.

7. QUANTITIES. The estimated quantities of sheet piling listed in the unit price schedule of the contract as to be furnished by the Contractor are given for bidding purposes only.

Sheet piling quantities for payment shall consist of the projected area of piling acceptably installed. This area includes the lengths of piles driven below the elevations indicated for the top of piles and the lengths of placed piles as shown on the drawings plus any additions thereto resulting from changes in design or alignment as provided in 2G-6.1.2.

8. MEASUREMENT AND PAYMENT.

8.1 Measurement. The length of each pile driven or pulled will be measured to the nearest tenth of a linear foot and converted to square feet for payment purposes. When driven piles are directed to be cut off before reaching penetration depths shown on the drawings, that portion cut off will be measured for payment on the basis of its total length, provided that the length is not greater than the difference between the total length of piles shown on the plans for that location and the length of piles driven below the point of cut-off. No deduction will be made for holes cut for drains and utilities, in computing the area of steel sheet pile structures.

8.1.1 Void Backfill. The sheet piling void backfill will not be measured for payment.

8.2 Payment.

8.2.1 Sheet Piling. Payment for steel sheet piling quantities will be made at the applicable contract price per square foot for "Piling, Steel Sheet, Type PZ-22", "Piling, Steel Sheet, Type PZ-27", and "Piling, Steel Sheet, Type PSA-23", which price shall include all-cost of fabricating, furnishing, driving, cutting holes, and all other work incidental to acceptably installing the steel sheet piling.

8.2.2 Cut-offs and Splices. Cut-offs and/or splices which are required to construct the sheet pile structures as shown on the drawings and as specified herein, and which are necessitated due to Contractor negligence in any procedure required to install such structures shall be provided at no additional cost to the Board. Cut-offs and/or splices which are required to install such structures shall be provided at no additional cost to the Board. Cut-offs and/or splices which are required through no fault of the Contractor shall be paid for by lump sum payments of \$10.00 per cut-off and \$25.00 per splice. Additionally, the portion of a Contractor furnished pile which is cut off, when the Contractor is deemed to be not at fault, shall be paid for at 70 percent of the applicable contract unit price for the amount measured in accordance with paragraph 8.1 above.

8.2.3 Pulled Piles. Piles which are directed to be pulled and found to be in good condition will be paid for at the contract price for furnishing and driving the pile in its original position plus an equal amount for the cost of pulling. Such pulled piles when redriven will be paid for at 50 percent of the applicable contract unit price for that portion of the pile redriven below cut off elevation. This price constitutes payment for redriving only; the cost of furnishing, initial driving and pulling the piles is to be paid for as specified above. When piles are pulled and found to be damaged, no payment will be made for originally furnishing and driving such piles, nor for the operation for pulling. Piles replacing damaged piles will be paid for at the contract unit price for the lengths driven.

END OF SECTION

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SECTION 2H - INCIDENTAL PAVING

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all plant, equipment, labor and materials and performing all operations in connection with the construction of concrete paving, asphalt paving and base at the gate openings, and construction of new sidewalks and curbs.

2. QUALITY CONTROL.

2.1 General. The Contractor shall establish and maintain quality control for excavation, compacting and paving operations to assure compliance with contract requirements and maintain records of his quality control for all construction operations including but not limited to the following:

- (1) Check grades where applicable.
- (2) Check width and thickness of all courses.
- (3) Check for proper compaction.
- (4) Check concrete mix, asphalt mix and aggregate materials and job mix for compliance with contract requirements; and inspect the test plant mixes and field densities in accordance with contract requirements.
- (5) Check prepared surfaces prior to applying paving materials.
- (6) Check coverage rate of application of primer and paving materials.
- (7) Check application of stripping material and compliance with applicable Federal specifications.

2.2 Reporting. The original and two copies of these records and tests, as well as the records of corrective action taken, shall be furnished to the Board daily. Format of report shall be as prescribed in Special Clauses.

PART 2 - PRODUCTS

3. SIGNS AND BARRICADES. The Contractor shall furnish, install, and maintain all necessary barricades, warning signs, danger signals, speed regulatory signs, directional signs and all other traffic devices, required by these specifications, the contract drawings, or the Chief Engineer in accordance with the Louisiana State Highway Specifications, Section 729, entitled "Traffic Signs and Devices," and Section 713, entitled "Temporary

Signs, Barricades and Pavement Markings." Requirements as to proper signs and barricades or other safety precautions as may be required by the Contractor's insurers, are not negated by these specifications. In no way shall specifications be construed as relieving the Contractor of any of his responsibilities for the safety of the traveling public, for any liability in connection therewith or compliance with State and local laws or ordinances.

4. BASE MATERIAL.

4.1 Sand-Shell. LDOTD Sec. 1003.03(c).

4.2 Cement. LDOTD Sec. 1001.

5. ASPHALT PAVING. The asphalt at the gate drives as shown shall consist of 3-1/2" of paving (1-1/2" wearing surface and 2" binder course).

6. SURFACE MATERIAL.

6.1 Bituminous Prime Coat shall be either MC-30 or MC-70 meeting current Federal Specifications SS-A-671c "Asphalt, Liquid; Slow-Curing, Medium-Curing and Rapid-Curing" for cutback asphalt. Application temperature shall be as follows subject to variation by the Chief Engineer in the field:

MC-30° -60°F. to 120°F.

MC-70° -100°F. to 180°F.

6.2 Reserved.

6.3 Bituminous Binder Course and Wearing Surface.

6.3.1 Aggregates shall be crushed stone, blast furnace slag, crushed gravel, sand or a mineral filler combination of those materials meeting Louisiana Department of Highways Standard Specifications for Aggregates for Asphaltic Concrete.

<u>Sieve Designation</u>	<u>Wearing Course</u> (% Passing) by Weight	<u>Binder Course</u> (% Passing) by Weight
1-1/4"	-	100
1"	100	90 - 100
3/4"	85 - 100	75 - 100
1/2"	70 - 100	55 - 95
No. 4	40 - 70	35 - 70
No. 10	25 - 55	20 - 50
No. 40	8 - 33	8 - 33
No. 80	5 - 20	5 - 20
No. 200	2 - 10	2 - 10

6.3.2 Crushed faces for binder course shall be a minimum of 60% by volume and 75% by volume for wearing surface.>

6.4 Mineral Filler conforming to ASTM Designation D-242-70 (1980), "Spec. for Mineral Filler for Bituminous Paving Mixtures" shall be provided as part of the fines for the wearing surface in an amount not less than 3% nor more than 5% by weight of total aggregate.

6.5 Asphalt Cement shall conform to the following requirements.

<u>TYPE - GRADE</u>	<u>TEST METHOD</u>	<u>SPECIFICATIONS</u>
Viscosity, 60°C (140°F) poises	AASHO T 202	4000+800
Viscosity, 135°C (275°F)		
SSF (*6)	ASTM E 102	200+
Viscosity, 135°C (275°F)Cs	AASHO T 201	400+
Penetration, 25°C (77°F)		
100g, 5 sec.	AASHO T 49	45+ (*3)
Solubility in Trichloroethylene %	AASHO T 44	99.0+
Flash Point, COC (°F)	AASHO T 48	232(450)+

Tests on Residue From Thin Film

Oven Test:

Viscosity, 60°C (140°F) poises	AASHO T 202	16000-
Ductility, 25°C (77°F), 5 cm/min.	AASHO T 51	100+
Spot Test		
(Standard Naptha Solvent)	AASHO T 102	Neg.

*3 For samples obtained at the point of delivery penetration requirements shall be 43-55.

*6 For samples obtained at the point of delivery the viscosity @ 275°F may be determined using ASTM E 102.

7. CONCRETE PAVING, SIDEWALKS AND CURB MATERIALS.

7.1 Concrete. LDOTD, Section 902, Class A.

7.1.1 Concrete Curing Materials.

7.1.1.1 Burlap. AASHTO M182 having a weight of 14 ounces or more per square yard when dry.

7.1.1.2 Liquid Membrane Curing Compound. ASTM C 309-81. Compound shall be free of paraffin or petroleum.

7.2 Reinforcing Steel.

7.2.1 Sidewalks. ASTM A 185.

7.2.2 Curbs. ASTM A 615, A 616, or A 617.

7.2.3 Concrete Paving. All new concrete paving shall match existing materials.

7.3 Joint Filler and Sealer. Joint filler shall be in accordance with 3C-6.1. Joint sealer shall be in accordance with ASTM D 1850.

7.4 Forms. Forms shall be of wood or steel, straight of sufficient strength to resist springing during depositing and consolidating concrete, and of a height equal to the full depth of the finished sidewalk or curb in each case.

8. INSPECTION AND TESTING.

8.1 Asphalt. Samples and testing will be handled at the Contractor's expense by an independent testing laboratory acceptable to the Chief Engineer. Inspection and testing services will be required for design and control of plant mixes (using Marshall method) and field density in order to determine compliance with specified provisions herein. At least one series of plant tests shall be conducted on each day's asphalt run.

8.2 Concrete.

8.2.1 Mix Design. The Contractor shall not be required to submit mix designs to the Chief Engineer for approval unless the total quantity of each class of concrete for the project exceeds 50 cubic yards; however, complete records of mixes being used shall be maintained by the Contractor and made available to the Chief Engineer at all times.

8.2.2 Inspection and Testing. Inspection and sampling of concrete shall be performed at the point of delivery. The Contractor shall be responsible for proper batching, mixing and transporting of concrete. Concrete obviously improperly batched, mixed or transported will be rejected. Concrete of each class will be test sampled by molding sets of 3 cylinders, with a minimum of one set per 50 cubic yards.

PART 3 - EXECUTION

9. ASPHALT PAVING BASE.

9.1 Cement treated shell and sand (5% cement by volume) shall be furnished and placed in accordance with applicable provisions of Section 301 of the Louisiana Department of Highways Standard Specifications for Roads and Bridges, 1982 edition.

9.2 Preparation for Asphalt Paving.

9.2.1 After the prepared base is cleaned with fiber brooms or other approved methods which will leave the surface free of cakes, dust or other objectionable material, primer shall be applied at the rate of .25 or .30 gallons per square yard and

allowed to cure for a minimum of 24 hours. Hot plant mix of bituminous binder course and wearing surface shall then be placed and compacted on the prepared base as hereinafter outlined.

9.2.2 Paving operations shall proceed only when the subgrade or base course is dry and the atmospheric temperature in the shade and away from artificial heat is above 40°F. and rising, unless otherwise directed by the Chief Engineer. The average of 4 Marshall stabilities for approval of the job mix formula shall conform to values as shown below:

<u>Type of Mix*</u>	<u>Marshall Stability @ 140°F. in Lbs.</u>		<u>Flow 1/100"</u>
	<u>Desirable Values</u>	<u>Minimum Requirements</u>	
Types 1 or 4, AC-40 BC & WC	1,500	1,100	15 max.

*State of Louisiana , Dept. of Hwys, Standard Spec. for Roads and Bridges, 1982 Edition.

9.3 Asphalt Job Mix Formula. After such laboratory design and testing as deemed necessary, the job mix formula for binder course and wearing surface shall be determined by the laboratory, subject to approval of the Chief Engineer within the following limitations:

	<u>Binder Course</u>		<u>Wearing Course</u>	
	<u>Minimum</u>	<u>Maximum</u>	<u>Minimum</u>	<u>Maximum</u>
Total mineral aggregate (by weight)	94%	96%	93.5%	95.0%
Bitumen (by weight)	4%	6%	5.0%	6.5%

9.4 Asphalt Road Equipment. All equipment, tools and machines used in the performance of work covered by this section shall be subject to the approval of the Chief Engineer.. A central plant shall be used for mixing of bituminous binder course and wearing surface, designed, coordinated, equipped and operated to produce a mixture meeting the job formula requirements. The plant may be either a weight batch type or a rotary drum type and shall have a minimum capacity of 75 tons per hour. The plant shall be equipped with accurate scales, and tanks for storage of bituminous materials, and shall be capable of heating under effective and positive control at all times to temperature requirements. Feeders, dryers, screens, bins and related equipment shall be in good operating condition, suitable for intended purposes, with accurate measurement and control devices. Satisfactory means shall be provided to obtain the proper amount of bituminous material specified either by weighing, metering or volumetric measures. Accurate thermometers

and gauges shall be fixed in the bituminous feed line near the discharge valve and the plant shall be equipped with positive means to govern and maintain required mixing time.

9.4.1 Bituminous spreaders shall be the self-propelled type, equipped with hoppers, distributing screws, adjustable screeds and equalizing devices, capable of spreading hot bituminous mixtures without tearing, shoving or gouging, and of producing a finished surface of specified evenness. Spreaders shall be designed to operate forward at variable speeds and in reverse. The use of approved spreaders operating on fixed side forms will be permitted.

9.4.2 Power rollers shall be the self-propelled rubber-tired rollers or shall be 3 wheel and tandem rollers, weighing not less than 10 tons.

9.4.3 Blowers and brooms shall be of the power type and shall be suitable for cleaning the surface to be paved.

9.4.4 Self-propelled rubber-tired rollers shall consist of 2 axles on which are mounted not less than nine pneumatic-tired wheels in such manner that the rear group of tires will not follow in the tracks of the forward group and will be centered between the forward wheels. The axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. The tires shall be uniformly inflated. The rollers shall be weighted with not less than 4.5 tons of ballast.

9.4.5 All lines and grades will be established by the Contractor and shall be maintained by means of grade stakes placed in lanes parallel to the center line of the areas to be paved, and spaced so that string lines may be stretched between the stakes.

9.4.6 The bituminous mixtures shall be produced in an approved plant as specified hereinbefore.

9.5 Preparation of Mineral Aggregates. In all cases the fine and coarse aggregate shall be applied separately, but may be fed to the drier by a common mechanical feeder. The aggregates shall be heated and thoroughly dried, then screened and stored in separate bins ready for mixing with the bituminous material. Adequate dry storage shall be provided for mineral filler.

9.6 Preparation of Asphalt Mixture. The aggregates, prepared as specified hereinbefore, and dry mineral filler shall be accurately weighed or measured and conveyed into the mixer in the proportionate amounts of each aggregate size required to meet the job-mix formula. The required amount of asphalt for each batch shall then be introduced into the mixer. In batch mixing, after the aggregates and mineral filler have been introduced into the mixer and mixed for not less than 15 seconds, the bituminous

material shall be added and mixing continued for a period of not less than 20 seconds and as much longer as may be required to obtain a homogeneous mixture. When a continuous mixer is employed, the mixing time shall be not less than 35 seconds and as much longer as may be required to obtain a homogeneous mixture. The additional mixing time, when required, shall be determined by the Chief Engineer. In no case shall the aggregate be introduced into a mixture at a temperature more than 25°F. above the temperature of the asphalt. The temperature of the bituminous material at the time of mixing shall not exceed 325°F. The temperature of the aggregate and mineral filler in the mixer shall not exceed 350°F. when the asphalt is added. The temperatures of both the aggregates and asphalt at the time of mixing shall be as determined by the Chief Engineer. When the mixture is prepared in twin pugmill mixer, the volume of the aggregates, mineral filler, and bituminous material shall not be so great so as to extend above the tops of the mixer blades when the blades are in a vertical position. All overheated and carbonized mixtures which foam or show indication of moisture, will be rejected by the Chief Engineer. When moisture is detected in the finished mixture, all aggregates in the bins shall be removed and placed in their respective stock piles.

9.7 Transportation. Transportation of bituminous mixture from the paving plant to the site shall be in trucks having tight, clean, smooth beds which have been oiled with a minimum amount of approved thin oil to prevent adhesion of the mixture to the truck bodies. Each load shall be covered with canvas or other suitable material of ample size to protect it from the weather and to prevent the loss of heat. Deliveries shall be made so that spreading and rolling of all the mixture prepared for a day's run can be completed during daylight. The mixture shall be delivered to the area to be paved in such manner that the temperature at the time of dumping into the spreader will not be less than that hereinafter specified. Any loads wet excessively by rain will be rejected by the Chief Engineer. Hauling over freshly laid material will not be permitted.

9.8 Placing. Prior to laying the binder of surface course, the underlying course shall be cleaned to all foreign or objectionable matter with power blowers, power brooms or hand brooms. The range of temperatures of the mixture, when dumped into the mechanical spreader specified hereinbefore, shall be as determined by the Chief Engineer. Mixtures that have temperatures less than 225°F. when dumped into the mechanical spreader will be rejected. The mechanical spreader shall be adjusted and the speed regulated so that the surface of the course will be smooth and of such depth that, when compacted, it will conform to the cross section, grade and contour shown on the drawings. The mixture shall be placed in strips having a minimum width of approximately 12 feet, and placing shall be as nearly continuous as possible. A sufficient number of experienced shovelers and rakers shall follow the spreading

machine, adding hot mixture and raking the mixtures as required to produce a course that, when compacted, will conform to all requirements specified herein. The loads shall not be dumped any faster than they can be properly handled by the shovelers and rakers. Rakers not equipped with stilt sandals shall not be permitted to stand in the hot mixture while raking the course.

9.9 Compaction. Compaction of mixtures shall be effected by the 3 wheel rollers and tandem rollers specified hereinbefore. Rolling of the mixture shall begin as soon after placing as the mixture will bear the roller without undue displacement. Delays in rolling freshly spread mixture will not be tolerated. Rolling shall start longitudinally at the extreme sides of the lanes and proceed toward the center of the pavement, overlapping on successive trips by at least 1/2 the width of the rear wheel of the roller. Alternate trips of the roller shall be of slightly different lengths. The initial longitudinal rolling shall be effected by the use of 3-wheel rollers. Tests for conformity with the specified crown, grade and smoothness shall be made by the Contractor under the supervision of the Chief Engineer. immediately after initial compression. Before continuing the rolling, any variations shall be corrected by removing or adding materials as directed by the Chief Engineer. The course shall also be subjected to diagonal rolling using the tandem rollers specified herein, crossing the lines of the first rolling while the mixture is hot and in a compactible condition. The speed of the rollers shall not exceed 3 miles per hour and shall at all times be slow enough to avoid displacement of the hot mixture. Any displacement of the mixture occurring as the result of reversing the direction of the roller, or from any other cause, shall be corrected at once by the use of rakes and fresh mixture applied or mixture removed as required. Rolling of both the surface course and binder course shall be continued until all roller marks are eliminated and specified density of 94% and 96% of laboratory density has been obtained for binder and wearing courses, respectively. During rolling, the wheels of the rollers shall be moistened to prevent adhesion of the mixture to the wheels, but an excess of water will not be permitted. The roller shall be operated by competent and experienced operators. The minimum number of rollers to be furnished by the Contractor shall consist of 1-3-wheel roller, 1 tandem roller and 1 pneumatic-tire roller conforming to the requirements specified hereinbefore, for each spreading machine in operation on the job. Skin patching of an area that has been rolled will not be permitted. Any mixture containing foreign material or in any way defective shall be removed, replaced with fresh mixtures, and compacted to the density of the surrounding area. The roller shall pass over the unprotected edge of the course only when the laying of the course is to be discontinued for such length of time as to permit the mixture to become cold. The surface course only shall be rolled with a rubber-tired roller, conforming to requirements specified hereinbefore, while the course is still warm. The rubber-tired roller shall follow immediately the 3-wheel roller, and rolling shall be continued until all of the surface course has been subjected to at least 3 coverages.

9.10 Joints. The joints between successive days' work shall be carefully made in such manner as to insure a continuous bond between old and new sections of the course. All contact surfaces of previously constructed pavements shall be painted with a thin, uniform coat of hot bituminous material. Immediately before the fresh mixture is placed, longitudinal joints between the wearing surface, binder and/or base shall have vertically cut faces and be staggered at least 6" between any of these successive different layers of material.

9.11 Protection. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cooled and hardened, and in no case less than 6 hours.

9.12 Smoothness Tests. The finished surface shall not vary more than $1/8$ inch for surface courses and $1/4$ inch for binder courses when tested with a 10-foot straightedge applied both parallel with and at right angles to the center line of the paved area. After the completion of the final rolling the smoothness of the course shall be checked, and the irregularities that exceed the specified tolerances or that retain water on the surface shall be corrected by removing the defective work and replacing with new material as directed by the Chief Engineer without additional cost to the Board.

10. CONCRETE PAVING, SIDEWALKS AND CURBS.

10.1 Subgrade Preparation. The subgrade shall be constructed to grade and cross section.

10.1.1 Sidewalk Subgrade. The subgrade shall be thoroughly wetted and then compacted with two passes of a 500 pound roller.

10.1.2 Curbs. The subgrade for curbs shall be prepared in accordance with 2J-9.1.

10.1.3 Concrete Paving. Concrete pavement shall be constructed in accordance with Section 706 of the LDOTD specifications.

10.2 Form Setting. Forms shall be set with the upper edge true to line and grade and shall be held rigidly in place by stakes placed at intervals not to exceed 4 feet. Clamps, spreaders, and braces shall be used where required to insure rigidity in the forms. The forms on the front of the curbs shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Side forms of sidewalks shall not be removed for less than 12 hours after finishing has been completed.

10.3 Concrete Placement and Finishing.

10.3.1 Sidewalk Concrete. After concrete has been placed in the forms, it shall be tamped and consolidated with a suitable wood or metal tamping bar, and finished to grade with a wood float. The finished surface of the sidewalk shall not vary more than 3/16-inch from the testing edge of a 10-foot straight edge. Construction joints shall be formed in the fresh concrete at 5 ft. on centers by cutting a groove in the top portion of the slab to a depth of a least one-fourth the sidewalk thickness, using a jointer to cut the groove. Expansion joints at 30 ft. on centers and where the sidewalk is in contact with curbs. Expansion joints shall be filled with 1/2-inch joint filler strips and fill with joint sealer after the concrete has cured.

10.3.2 Curb Concrete. The curb surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float. Except at grade changes or curves, finished surfaces shall not vary, from the testing edge of 10-foot straightedge, more than 1/8 inch for gutter and entrance and 1/4 inch for top and face of curb. Irregularities exceeding the above shall be satisfactorily corrected. Visible surfaces and edges of finished curb and gutter shall be free of blemishes and form and tool marks, and shall be uniform in color, shape, and appearance. Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of the curb. Expansion joints shall be 1/2-inch in width and shall be provided at 30 ft. intervals.

10.3.3 Concrete Pavement. LDTOD Section 706(d).

10.4 Curing. Immediately after the finishing operations, exposed concrete surfaces shall be cured by one of the following methods.

10.4.1 Mat Method. The entire exposed surface shall be covered with two or more layers of burlap. Mats shall overlap each other at least 6 inches. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

10.4.2 Membrane-Curing Method. The entire exposed surface shall be covered with a membrane-forming curing compound. Where Type I curing compound is used, the concrete shall be shaded free from the direct rays of the sun. Curing compound shall be applied in two coats by hand-operated pressure sprayers of a

coverage of approximately 200 square feet per gallon for both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. Additional application requirements shall be in accordance with the manufacturers recommendations. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected for 7 days from pedestrian and vehicular traffic and from any other action that might disrupt the continuity of the membrane.

10.5 Sealing Joints. The approximately horizontal sections of expansion joints shall be sealed with a joint sealer.

11. PAYMENT. Payment for paving at the gate openings, construction of sidewalks and curbs will be included in the contract lump sum price for incidental paving.

The price and payment shall constitute full compensation for performing all operations necessary in construction and maintenance of asphalt and concrete streets, sidewalks, and curbs.

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SECTION 2I - FERTILIZING AND SEEDING

PART 1 - GENERAL

1. **SCOPE.** The work provided for herein consists of furnishing all plant, labor, equipment, and materials, and performing all operations necessary for finished dressing, fertilizing and seeding areas as specified herein and as indicated on the drawings. The period of the year in which fertilizing and seeding is done will determine the method indicated in Table I which shall be followed for that particular area. Only one of the methods listed in Table I will be required.

2. QUALITY CONTROL.

2.1 **General.** The Contractor shall establish and maintain quality control for finished dressing, fertilizing, and seeding operations to assure compliance with the contract specifications and shall maintain records of his quality control for all construction operations including, but not limited to, the following:

(1) **Preparation of Ground Surface.** Location and quality of finish dressing, including necessary clearing, filling, or dressing out of washes, smoothness and uniformity of surfaces, and time of year.

(2) **Fertilizing.** Quality of materials. Areas fertilized, quantity applied, and method of application.

(3) **Seeding.** Quality and type of seed area covered, rate of application, quantity of seed used, and method of distribution.

(4) **Mulching.** Quality of materials, area mulched, quantity applied, method of application.

2.2 **Reporting.** The original and two copies of these records of inspections and tests, as well as the records of corrective action taken, shall be furnished the Board daily. Format of the report shall be as prescribed in Special Clauses.

3. RESERVED.

4. COMMENCEMENT, PROSECUTION, AND COMPLETION.

4.1 **General.** Preparation of the ground surface, fertilizing, and seeding operations shall be accomplished during the applicable growing season as specified in Table I (Page 2I-2). Mulching may be required. (See 2I-11.)

4.2 Sequence of Work. The sequence of operations for work prescribed in this section, except mowing, shall be as follows:

- (1) Preparation of Ground Surface
- (2) Fertilizing
- (3) Seeding
- (4) Mulching (See paragraph 2I-11)

PART 2 - PRODUCTS

5. MATERIALS.

5.1 Fertilizer. Fertilizer shall be uniform in composition and free-flowing. The fertilizer may be delivered to the site in bags or other convenient containers or delivered in bulk. If delivered in bags or containers, the fertilizer shall be fully labeled in accordance with the applicable state fertilizer laws and shall bear the name, tradename or trademark, and warranty of the producer. The fertilizer shall meet the requirements for commercial fertilizer and shall contain a minimum of 60 pounds of available nitrogen per acre. Should the commercial fertilizer be furnished in bulk, the Contractor shall furnish certified weight tickets and a certified quantitative analysis report, in triplicate, from a recognized testing laboratory certifying the nutrient ratio of the materials. In the event the commercial mixture is delivered to the job site in the original containers, unopened, the analysis report will not be required.

5.2 Soil for Repairs. For fill of areas to be repaired, soil shall be of a quality at least equal to that which exists in areas adjacent to the area to be repaired. Soil used shall be relatively free from roots, stones, and other materials that hinder grading, planting, and maintenance operations and shall be free from objectionable weed seeds and toxic substances.

5.3 Seed. Seed labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act shall be furnished by the Contractor. Seed shall be furnished in sealed, standard containers unless written exception is granted. Seed that is wet or moldy or that has been otherwise damaged in transit or storage will not be acceptable. The specifications for seeds shall conform to the following and be seeded at the following rates:

<u>Seeding Period and Grasses to be Used</u>	<u>Minimum Purity%</u>	<u>Minimum Germination%</u>	<u>Minimum Lbs/Acre</u>
<u>2 March - 14 September</u>			
Hulled common Bermuda grass	95	87	30
White Clover	95	85	6
<u>15 September - 30 November</u>			
Unhulled common Bermuda grass	95	87	35
White Clover	95	85	6
Winter Rye	95	86	35
<u>1 December - 1 March</u>			
Unhulled common Bermuda grass	95	87	35
White Clover	95	85	6
Ryegrass	97	82	25

5.4 Mulch. Threshed straw from cereal grain such as oats, wheat, barley, rye, or rice; grass hay shall be furnished and applied by the Contractor. Materials that contain noxious grass or weed seeds that might be detrimental to the seeding operation will not be acceptable.

5.5 Wood-Cellulose Fiber Mulch. Wood cellulose fiber mulch for use with hydraulic application equipment shall consist of wood cellulose fiber, processed to contain no growth or germination inhibiting factors, and dyed an appropriate color to facilitate visual metering of application of the materials. The mulch material shall be supplied in packages having a net weight not in excess of 100 pounds. The wood cellulose fiber shall contain not in excess of 10 percent moisture, air dry weight basis. The wood cellulose fiber shall be manufactured so that after addition and agitation in slurry tanks, with water, and any other additives, the fibers in the material will become uniformly suspended to form a homogeneous slurry, and that when hydraulically sprayed on the ground, the material will form a blottor-like cover which, after application, will allow the absorption of moisture and allow rainfall to percolate to the underlying soil. The Contractor shall be prepared to submit, on request, certification from the supplier that laboratory and field testing of the product has been accomplished, and that the product meets the foregoing requirements.

5.6 Asphalt Adhesive. Asphalt adhesive for use with straw or hay mulch shall be either liquid asphalt conforming to ASTM D 2028-76 (1981) for "Liquid Asphalt (Rapid-Curing Type)," designation RC-70, or emulsified asphalt conforming to ASTM D 977-80 for "Emulsified Asphalt," grade MS-2.

6. SAMPLING AND TESTING.

6.1 General. Sampling and testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Board. Sampling and testing shall be

performed by a recognized commercial testing laboratory or may be performed by the Contractor. Tests shall be performed in sufficient number to insure that materials meet the specified requirements. Signed copies of the test results shall be furnished to the Chief Engineer.

6.2 Material Testing.

6.2.1 Fertilizer. Duplicate signed copies of invoices from suppliers shall be furnished. Invoices shall show quantities of nitrogen. Upon completion of the project, a final check of the total quantity of fertilizer used will be made against total area treated, and if minimum rates of application have not been met, an additional quantity of material sufficient to make up the minimum application rate shall be distributed as directed.

6.2.2 Seed. The Chief Engineer shall be furnished duplicate signed copies of statements certifying that each container of seed delivered is labeled in accordance with the Federal Seed Act and is at least equal to the requirements specified in 2I-5.3. This certification shall be obtained from the supplier and shall be furnished on or with all copies of seed invoices.

6.2.3 Mulch. Representative samples of the materials proposed for use shall be submitted for approval.

6.2.4 Asphalt Adhesive. The Contractor shall demonstrate, before starting the work, that the asphalt can be applied as specified and that the method of application is satisfactory. The Chief Engineer shall be furnished copies of the manufacturer's specification for asphalt adhesive and certification of conformance with the requirements of the manufacturer with respect to residue, solubility, dehydration, settlement, miscibility, and mixing properties.

7. SPECIAL EQUIPMENT.

7.1 Mulch Spreader. The mulch spreader used for applying straw or hay mulch shall be equipped with a blower that is capable of discharging hay or straw mulch material through a discharge spout at speeds up to 220 feet per second. The discharge spout shall be capable of 360-degree horizontal rotation and have a minimum of 60-degree range of elevation and depression. The mulch spreader shall be equipped with an asphalt adhesive supply and application system, near the discharge end of the boom spout, that is capable of applying an asphalt adhesive in atomized form to the mulch material at a predetermined rate. The spreader shall be capable of blowing the adhesive coated mulch over the surface of a graded or otherwise prepared slope at a uniform rate, forming a porous, stable, erosion-resisting cover at a distance of not less than 100 feet.

7.2 Wood-Cellulose Fiber Mulch Spreader. Hydraulic equipment used for the application of slurry of prepared wood pulp shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry containing up to 300 pounds of fiber for each 1,000 gallons of water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with hydraulic spray nozzles that will provide even distribution of the slurry on the various slopes to be mulched. The slurry tank shall have a minimum capacity of 1,000 gallons and shall be mounted on a traveling unit, which may be either selfpropelled or drawn by a separate unit, that will place the slurry tank and spray nozzles near the areas to be mulched so as to provide uniform distribution without waste. The Chief Engineer may authorize equipment with a smaller tank capacity provided that the equipment has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat over the surface of the area to be mulched.

PART 3 - EXECUTION

8. PREPARATION OF GROUND SURFACE.

8.1 General. Equipment, in good condition, shall be provided in the proper preparation of the ground and for handling and placing all materials. Equipment shall be approved by the Contracting Officer before work is started.

8.2 Clearing. Prior to grading and tilling, vegetation and debris that may interfere with fertilizing and seeding operations shall be mowed, grubbed, and raked; and shall be disposed of satisfactorily, as prescribed in 2B-7.

8.3 Reserved.

8.4 Tillage. After the areas required to be fertilized and seeded have been brought to the specified grades, the soil shall be tilled to a depth of at least 1-1/2 inches by plowing, disking, harrowing, or other approved operations until the condition of the soil is acceptable. The work shall be performed only during periods when, in the opinion of the Chief Engineer beneficial results are likely to be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. Undulations or irregularities in the surface to be fertilized and seeded shall be dressed before the next specified operation.

9. APPLICATION OF FERTILIZER.

9.1 Fertilization of Areas to be Seeded. Fertilizer shall be distributed uniformly over areas to be seeded and shall be incorporated into the soil to a depth of at least 2 inches by disking, harrowing, or other acceptable methods. Incorporation of fertilizer may be part of the operation specified in 2I-8.4.

10. SEEDING.

10.1 General. The applicable seed shall be sown at the rate and time as indicated on Table I, unless otherwise directed in writing. A satisfactory method of sowing shall be employed, using approved mechanical power-drawn drills or seeders, mechanical hand-seeders, broadcast-seeders, or other approved methods. When delays in operations extend the work beyond the most favorable planting season for the species designated, or when conditions are such by reason of drought, high winds, excessive moisture, or other factors that satisfactory results are not likely to be obtained, work shall be halted as directed and resumed only when conditions are favorable or when approved alternative or corrective measures and procedures have been effected. If inspection either during seeding operations or after there is a show of green indicates that strips wider than the space between rows planted have been left unplanted or other areas have been skipped, additional seed shall be sown if so directed.

10.2 Broadcast Seeding. If the broadcast method of seeding is used, seed shall be broadcast with approved sowing equipment and distributed uniformly over designated areas. Seed shall be covered to an average depth of 1/4 inch by brush harrow, spike-tooth harrow, chain harrow, cultipacker, or other approved device. Seed shall not be broadcast during windy weather.

10.3 Damage to Seeding. The Contractor shall be fully responsible for any damage to the seeded areas caused by his operations. Areas that become damaged as a result of poor workmanship or failure to meet the requirements of the specifications may be ordered to be repaired and reseeded to specification requirements, without additional cost to the Board.

11. MULCHING.

11.1 General. During the period of 1 Dec through 1 Mar, the Contractor may elect to seed providing he mulches at his own expense immediately thereafter.

11.2 Mulch. Mulch, as specified in 2I-5.4, shall be applied uniformly on the soil surface at the rate of 1-1/2 tons (approximately 60 bales) per acre immediately after seeding. Mulch shall be tacked by spraying with asphalt adhesive specified in 2I-5.6 at the rate of 150 gallons per acre.

12. MOWING. The seeded areas shall be mowed with approved mowing equipment to a height of 3 to 4 inches whenever the height of vegetation becomes 6 to 8 inches. When the amount of grass is heavy, it shall be removed to prevent destruction of the underlying turf. The Contractor shall be responsible for mowing until the physical completion of all items of the contract.

13. DAMAGE TO SEEDING. The Contractor shall be fully responsible for any damage to the seeded areas caused by his operations. Areas that become damaged may be ordered to be repaired and reseeded to specification requirements, without cost to the Board.

14. MAINTENANCE. Maintenance shall consist of watering and mowing as specified in 2I-12, and any other work incidental to proper maintenance. Maintenance will be required until the contract is completed.

15. INSPECTION AND ACCEPTANCE. Final acceptance will be made on completion of the contract. Acceptance of the established fertilized and seeded areas will be made by the Chief Engineer representative, and will be determined by visual inspection.

16. MEASUREMENT AND PAYMENT. No separate measurement or payment will be made for fertilizing and seeding. Payment for fertilizing and seeding will be made at _____ in the contract lump sum price for "Fertilizing and Seeding", which price and payment shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing all operations necessary in accordance with these specifications.

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SECTION 3A - FORMWORK FOR CONCRETE

PART 1 - GENERAL

1. RELATED WORK SPECIFIED ELSEWHERE.

- 1.1 Structural Sitecast Concrete. Section 3D.
- 1.2 Reinforcing Steel. Section 3B.
- 1.3 Expansion, Contraction and Construction Joints.
Section 3C.

2. REFERENCE STANDARDS.

- 2.1 American Concrete Institute (ACI) Standards.
ACI 347-78 Recommended Practice for Concrete Formwork
- 2.2 U.S. Department of Commerce, National Bureau of Standards (NBS) Product Standard.
PS 1-74 For Construction and Industrial Plywood

3. SUBMITTALS.

3.1 Shop Drawings. Formwork required to produce Class A finish, external bracing, or where otherwise indicated on the drawings, shall be submitted for review and shall show the plan for jointing of facing panels and erection details.

3.2 Manufacturers Literature shall be submitted for plywood, concrete forming materials, form accessories, prefabricated forms, form coating and form lining materials proposed for use.

PART 2 - PRODUCTS

4. DESIGN. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor. The formwork shall be designed for loads, lateral pressure and allowable stresses in accordance with Chapter 2 of ACI Standard 347. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances. For Class A finish, the design shall be made to limit deflection of facing material between studs as well as deflection of studs and walers to 0.0025 times the span.

5. MATERIALS.

5.1 Forms shall be fabricated with facing materials that produce the specified construction tolerance requirements of Section 3D-4.2 and the surface requirements of Section 3D-4.3.

5.1.1 Class "A" Finish. This class of finish shall apply to columns, I-walls, T-walls, and to all exterior formed surfaces not covered by backfill. The form facing material shall be composed of new, well-matched tongue and groove lumber or new plywood panels conforming to NBS Product Standard PS-1, Concrete Form, Class I, Grade B Plyform, High Density Overlay, Exterior Type or Structural I, Grade B Plywood, High Density Overlay, all Exterior Type. The grade B side of the Plyform shall face the concrete.

5.1.2 Class "D" Finish. This class of finish shall apply to unexposed surfaces. The sheathing may be of wood or steel.

5.2 Form Accessories. Ties and other similar form accessories to be partially or wholly embedded in the concrete shall be of a commercially manufactured type. After the ends or end fasteners have been removed, the embedded portion of metal ties shall terminate not less than 2-inches from any concrete surface either exposed to view or exposed water. Plastic snap ties may be used in locations where the surface will not be exposed to view. Form ties shall be constructed so that the ends or end fasteners can be removed without spalling the concrete.

5.3 Form Coating shall be a commercial formulation of satisfactory and proven performance that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.

PART 3 - EXECUTION

6. INSTALLATION.

6.1 Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements of Section 3A, paragraph 10 and conforming to construction tolerance of Section 3D, paragraph 4.2 and appropriate class of finish as described on the drawings and paragraph 5.1 in this Section 3A. Where concrete surfaces are to be permanently exposed to view, joints in form panels shall be arranged to provide a pleasing appearance. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface and gasketed with closed cell compressible neoprene so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of surface wear and tear or defects which would impair the quality of the surface. All surfaces of forms and embedded materials shall be cleaned of any mortar from previous concreting and of all other foreign material before concrete is placed in them.

7. CHAMFERING. All exposed joints, edges and external corners shall be chamfered as specified on the drawings by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified. Chamfered joints shall not be permitted where earth or rockfill is placed in contact with concrete surfaces. Chamfered joints shall be terminated a sufficient distance outside the limit of the earth or rockfill so that the end of the joints will be clearly visible.

8. COATING. Forms for exposed or painted surfaces shall be coated with form oil or a form-release agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

9. REMOVAL. Forms shall not be removed without approval and all removal shall be accomplished in a manner which will prevent injury to the concrete. Forms shall not be removed before the expiration of the minimum time indicated below, except as otherwise directed or specifically authorized. When conditions of the work are such as to justify the requirement, forms will be required to remain in place for a longer period.

9.1 Unsupported Concrete. Formwork for walls, columns, sides of beams, gravity structures and other vertical type forms not supporting the weight of concrete shall not be removed in less than 24 hours. The time depends on temperature, lift heights and type and amount of cementitious material in the concrete. Where forms for columns, walls and sides of beams also support formwork for slabs or beam soffits, the removal time shall not be less than 48 hours.

10. SURFACE REQUIREMENTS. Allowable tolerances in the structure for each class of finish caused by offsets resulting from displaced, misplaced or mismatched forms or sheathing or loose knots in sheathing, or other similar form defects shall be as stated in para. 3D-4.3.

11. FIELD QUALITY CONTROL. Forms and embedded items, ties and other accessories as specified in 3A-5.2 shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Chief Engineer that they are ready to receive concrete. Inspection of forms shall include a detailed evaluation of leakage control methods, type and application of release agent, and form cleanliness to avoid dirt transfer to the concrete. The results of each inspection shall be reported in writing.

12. PAYMENT. No separate payment will be made for formwork and all costs in connection therewith shall be included in the lump sum prices for items of work to which the work is incidental.

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SECTION 3B - REINFORCING STEEL

PART 1 - GENERAL

1. **SCOPE.** The work covered by this section consists of furnishing all equipment, materials, techniques and labor for providing and placing steel bars, and accessories for concrete reinforcement.

2. **RELATED WORK SPECIFIED ELSEWHERE.**

2.1 **Formwork.** Section 3A, FORMWORK FOR CONCRETE.

2.2 **Joints.** Section 3C, EXPANSION AND CONSTRUCTION JOINTS.

2.3 **Concrete.** Section 3D, STRUCTURAL SITECAST CONCRETE.

3. **APPLICABLE PUBLICATIONS.** The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

3.1 **American Concrete Institute (ACI) Standards.**

ACI 315-80	Details and Detailing of Concrete Reinforcement
ACI 315R-80	Manual of Engineering and Placing for Detailing Reinforced Concrete Structures
ACI 318-83	Building Code Requirements for Reinforced Concrete

3.2 **American Society for Testing and Materials (ASTM Standards).**

A 185-79	Welded Steel Wire Fabric for Concrete Reinforcement
A 615-82	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
E 8-83	Tension Testing of Metallic Materials

4. **QUALITY CONTROL.**

4.1 **Materials Tests.** The Contractor shall have required material tests performed by an approved laboratory to demonstrate that the materials are in conformance with the specifications. Tension tests shall be performed on full cross section specimens in accordance with ASTM E 8, using a gage length that spans the extremities of specimens with welds or sleeves included. Tests shall be at the Contractor's expense.

5. SUBMITTALS.

5.1 Shop Drawings. The Contractor shall prepare and submit complete shop drawings to the Chief Engineer for approval in accordance with specified requirements. Shop drawings shall include the following details of bar supports including types, sizes, spacing and sequence.

(1) Reinforcement steel schedules complete with the quantity, shape and size, dimensions, and bending details.

(2) Details of bar supports including types, sizes, spacing and sequence.

5.2 Test Reports. Certified test reports of reinforcement steel showing that the steel complies with the applicable specifications shall be submitted to the Chief Engineer by the Contractor. Reports shall be furnished for each steel shipment and shall be identified with specific lots prior to use of the steel in the work.

5.3 Disposition Records. A system of identification which shows the disposition of specific lots of approved test materials in the work shall be established and submitted to the Chief Engineer before completion of the contract.

PART 2 - PRODUCTS

6. MATERIALS.

6.1 Reinforcing Steel.

6.1.1 Billet-Steel Bars shall conform to ASTM A 615, Grade 40 for bar sizes 3 through 11, including the following requirements:

(1) Tension test specimens shall be bars of full cross section as rolled for all sizes.

(2) The bend test requirements shall be based upon 180 degree bends of full size bars for all grades of steel. The bend diameters for bend tests shall be as indicated in the following table and shall be measured on the inside of bars:

<u>Bar Size</u>	<u>Maximum Diameter</u>
#3, #4 and #5	4 bar diameters
#6, #7 and #8	5 bar diameters
#9, #10 and #11	5 bar diameters

NOTE: Grade 60 may be substituted on a one to one basis at no additional cost to the Board.

6.2 Reinforcing Steel Accessories.

6.2.1 Bar Supports shall conform to ACI 315. Bar supports for formed surfaces exposed to view or to be painted shall be plastic protected wire, stainless steel or precast concrete supports. Precast concrete bar supports shall be wedge-shaped, not larger than 3-1/2 x 3-1/2 inches, of thickness equal to that indicated for concrete cover and shall have an embedded hooked tie wire for anchorage. If formed surface is exposed to view, the precast concrete bar support shall be the same quality, texture and color as the finished surface.

6.2.2 Wire Ties shall be 16-gage or heavier black annealed wire.

6.2.3 Welded Wire Fabric shall conform to ASTM A 185.

PART 3 - EXECUTION

7. INSTALLATION. Reinforcement steel and accessories shall be installed or placed as specified and as shown on contract and approved shop drawings. Placement details of reinforcement and accessories not specified or shown on drawings shall be in accordance with ACI 315 or ACI 318. Reinforcement shall be fabricated to shapes and dimensions shown, placed where indicated within the specified tolerances and adequately supported during concrete placement. At the time of concrete placement all reinforcement shall be free from loose, flaky rust, scale (except tight mill scale), mud, oil, grease or any other coating that might reduce the bond with the concrete.

7.1 Hooks and Bends. Reinforcement bars may be mill or field bent. All bars shall be bent cold unless otherwise authorized. No bars partially embedded in concrete shall be field bent unless indicated on the drawings or otherwise authorized. All hooks or bends shall be in accordance with ACI 318.

7.2 Reserved.

7.3 Placing Tolerances.

7.3.1 Spacing of Bars. Bars shall be spaced as indicated on the drawings or as otherwise directed. The spacing between adjacent bars and the distance between layers may not vary from the indicated position by more than one bar diameter nor more than one inch, whichever is less.

7.3.2 Concrete Cover. The minimum and maximum concrete cover of main reinforcement steel shall be as indicated on the drawings. The concrete shall be as follows:

MINIMUM COVER

6"
4"
3"
2-1/2"
2"
1-1/2"
1"
3/4"

MAXIMUM COVER

6-1/2"
4-3/8"
3-3/8"
2-3/4"
2-1/4"
1-3/4"
1-1/8"
7/8"

7.4 Splicing. Splices in reinforcement steel shall be as specified, shown on the drawings or as directed by the Chief Engineer. Bars may be spliced at alternate or additional locations at no additional cost to the Board, subject to the approval of the Chief Engineer. Except as provided herein, all splicing shall be in accordance with approved splicing procedures and the requirements of ACI 318.

7.4.1 Lapped Splices shall be used only for bars smaller than size #14. Bar laps may be placed in contact and securely tied or may be spaced transversely apart to permit the embedment of the entire surface of each bar in concrete, but shall not be spaced farther apart than one-fifth the required length of lap nor 6-inches. Lengths of laps for bars or welded wire fabric shall conform to the requirements of ACI 318, except when otherwise shown on the drawings.

8. PAYMENT.

8.1 Bars. No measurement of reinforcing bars will be made. Furnishing and placing reinforcement bars will be included in the contract lump sum prices for the items of work to which reinforcement bars are incidental.

8.2 Accessories. No separate payment will be made for accessories and payment therefor shall be included in the contract prices for the items of work to which the accessories are incidental.

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SECTION 3C - EXPANSION AND CONSTRUCTION JOINTS

PART 1 - GENERAL

1. SCOPE. This section covers the materials, techniques and workmanship requirements for forming expansion and construction joints in concrete structures.

2. RELATED WORK SPECIFIED ELSEWHERE. Major requirements for concrete work as specified in Section 3D, STRUCTURAL SITECAST CONCRETE..

3. APPLICABLE PUBLICATIONS. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

3.1 American Society of Testing and Materials (ASTM) Standards. (With corresponding U.S. Army Corps of Engineers Handbook for Concrete and Cement (CRD) Specifications where indicated).

D 1751-83 (CRD-C 508)	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
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D 1752-67 (1978) (CRD-C 509)	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
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3.2 U.S. Army Corps of Engineers Handbook for Concrete and Cement (CRD) Specifications.

CRD-C 513-74	Rubber Waterstops
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CRD-C 572-74	Polyvinylchloride Waterstops
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4. QUALITY CONTROL.

4.1 Materials Tests.

4.1.1 Non-Metallic Waterstops. Samples of materials and splices as required in 3C-5.1 shall be visually inspected and tested by and at the expense of the Board. for compliance with CRD-C 513 or CRD-C 572, as applicable. If a sample fails to meet the specification requirements, new samples shall be provided and the cost of retesting will be deducted from payments due the Contractor at the rate of \$500.00 per material sample retested and \$500.00 per slice sample retested.

4.2 Qualifications of Splicing Procedures for Waterstops. Procedures for splicing waterstops shall be submitted to the Chief Engineer for approval.

4.2.1 Non-Metallic Waterstops. Procedure and performance qualifications for splicing non-metallic waterstops shall be demonstrated by the manufacturer at the factory and the Contractor at the job site by each making three splice samples of each size and type of finished waterstops for inspection and testing.

5. SUBMITTALS.

5.1 Test Reports. Certified manufacturer's test reports shall be provided for premolded expansion-joint filler strips, compression seals and lubricant, to verify compliance with the applicable specification.

5.2 Samples. The Contractor shall supply waterstop materials and splice samples for inspection and testing and shall identify so as to indicate manufacturer, type of material, size and quantity of material and shipment represented. Each materials sample shall be a piece not less than 12 inches long cut from each 200 feet of finished waterstop furnished, but not less than a total of four linear feet of each type and size furnished. For spliced segments of waterstops to be installed in the work, one splice sample of each size and type for every 50 splices made in the factory and every 10 splices made at the job site shall be furnished for inspection and testing. The splice samples shall be made using straight run pieces with the splice located at the mid-length of the sample and finished as required for the installed waterstop. The total length of each splice sample shall be not less than 12 inches long. Test samples shall be furnished at least 45 days prior to the installation of waterstops in the work.

PART 2 - PRODUCTS

6. MATERIALS.

6.1 Expansion Joint Filler Strips, Premolded shall conform to ASTM D 1751 or ASTM D 1752, Type I or resin impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

6.2 Waterstops.

6.2.1 Non-Metallic. Rubber waterstops shall conform to CRD-C 513. Polyvinylchloride waterstops shall conform to CRD-C 572.

PART 3 - EXECUTION

7. INSTALLATION. Joint locations and details, including materials and methods of installation of joint fillers and waterstops, shall be as specified, shown on the drawings and as directed. In no case shall any fixed metal be continuous through an expansion joint.

7.1 Expansion Joints. Premolded filler strips shall be accurately positioned and secured against displacement to clean, smooth concrete surfaces. Material used to secure premolded fillers to concrete shall not harm the concrete. The groove shall be thoroughly cleaned of all laitence, curing compound, foreign materials, protrusions of hardened concrete. Any dust shall be blown out of the groove with oil-free compressed air.

7.2 Waterstops shall be installed in joints as shown on the drawings or as otherwise directed. Waterstops shall be carefully and correctly positioned during installation to eliminate faulty installation that may result in joint leakage. All waterstops shall be installed so as to form a continuous watertight diaphragm in each joint. Adequate provision shall be made to support and protect the waterstops during the progress of work. Any waterstop punctured or damaged shall be replaced or repaired at the Contractor's expense. The concrete shall be thoroughly consolidated in the vicinity of the waterstop. Suitable guards shall be provided to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued.

7.2.1 Splices. Joints in waterstops shall be spliced together using the approved splicing procedures to form a continuous watertight diaphragm.

7.2.1.1 Non-Metallic Waterstops. All splices shall be made on a bench in a temporary shop provided at the site of the installation or at the manufacturer's plant. A miter guide and portable power saw shall be used to cut the ends to be joined to insure good alignment and contact between joined surfaces. The continuity of the characteristic features of the cross section of the waterstop shall be maintained across the splice.

7.2.1.1.1 Rubber Waterstops. Splices shall be vulcanized in accordance with the manufacturer's procedures.

7.2.1.1.2 Polyvinylchloride Waterstops. Splices shall be made by heat sealing the adjacent surfaces in accordance with manufacturer's written recommendations. A thermostatically controlled electric source of heat shall be used to make all splices. The correct temperature at which splices should be made will differ with the material concerned but the applied heat should be sufficient to melt but not char the plastic.

Waterstops shall be reformed at splices with a remolding iron with ribs or corrugations to match the pattern of the waterstop. The spliced area, when cooled and bent by hand in as sharp an angle as possible, shall show no sign of separation.

8. PAYMENT.

8.1 Expansion Joints and Waterstops. No separate payment will be made for expansion joints and waterstops, and all costs in connection therewith shall be included in the contract lump sum prices for the items of work to which the work is incidental.

8.2 Expansion Joint Fillers. No separate payment will be made for furnishing, cutting, and installing the expansion joint filler and all costs in connection therewith shall be included in the contract lump sum prices for the items of work to which the work is incidental.

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SECTION 3D - STRUCTURAL SITECAST CONCRETE

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all material and equipment and performing all labor for the manufacture, transporting, placing, finishing and curing of concrete as specified herein.

2. APPLICABLE PUBLICATIONS.

2.1 Expansion and Construction Joints in Concrete - Section 3C.

2.2 Reinforcing Steel - Section 3B.

2.3 Formwork for Concrete - Section 3A.

2.4 Reference Standards.

2.4.1 American Concrete Institute (ACI) Standards.

ACI 116R-78	Cement and Concrete Terminology
ACI 211.1-81 (CRD-C99)	Standard Practice for Selecting Proportions for Normal Weight and Heavyweight Concrete
ACI 214-77	Recommended Practice for Evaluation of Compression Test Results of Field Concrete
ACI 301-72	Specifications for Structural Concrete for Buildings
ACI 303R-74	Guide to Cast-in-Place Architectural Concrete Practice
ACI 304-73 (Reaffirmed 78)	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI 305R-77 (revised 1982)	Hot Weather Concreting
ACI 306-78	Cold Weather Concreting
ACI 308-71	Standard Practice for Curing Concrete
ACI 309-82 (revised 1982)	Standard Practice for Consolidation of Concrete

2.4.1 American Concrete Institute (ACI) Standards. (Cont'd)

- ACI 318-83 Building Code Requirements for Reinforced Concrete
- ACI 504R-77 Guide to Joint Sealants for Concrete Structures

2.4.2 American Society for Testing and Materials (ASTM) with Corresponding CRD Standard Indicated Where Available.

- C 29-78 (CRD-C 106) Unit Weights and Voids in Aggregates
- C 31-84 (CRD-C 11) Making and Curing Concrete Test Specimens in the Field
- C 33-84 (CRD-C 133) Concrete Aggregates
- C 39-83b (CRD-C 14) Compressive Strength of Cylindrical Concrete Specimens
- C 70-79 (CRD-C 11) Surface Moisture of Fine Aggregate
- C 94-83 (CRD-C 31) Ready-Mixed Concrete
- C 109-80 (CRD-C-227) Compressive Strength of Hydraulic Cement Mortars
- C 125-82a (CRD-C 43) Terms Relating to Concrete and Concrete Aggregates
- C 127-84 (CRD-C 107) Specific Gravity and Adsorption of Coarse Aggregate
- C 128-84 (CRD-C 108) Specific Gravity and Adsorption of Fine Aggregate
- C 136-84 (CRD-C 103) Sieve Analysis of Fine and Coarse Aggregates
- C 143-78 (CRD-C 5) Slump of Portland Cement Concrete
- C 150-84 (CRD-C 201) Portland Cement
- C 171-69 (CRD-C 310) Sheet Materials for Curing Concrete (1980)
- C 172-82 (CRD-C 4) Sampling Fresh Concrete
- C 192-81 (CRD-C 10) Making and Curing Concrete Test Specimens in the Laboratory
- C 231-82 (CRD-C 41) Air Content of Freshly Mixed Concrete by the Pressure Method

2.4.2 American Society for Testing and Materials (ASTM) with Corresponding CRD Standard Indicated Where Available. (cont'd)

C 260-77 (CRD-C 13)	Air Entraining Admixture for Concrete
C 451-75 (CRD-C-259)	Early Stiffening of Portland Cement (Paste Method)
C 494-82 (CRD-C 87)	Chemical Admixtures for Concrete
C 566-84 (CRD-C 113)	Total Moisture Content of Aggregate by Drying
C 595-83a (CRD-C 203)	Blended Hydraulic Cements
C 617-84 (CRD-C 21)	Capping Cylindrical Concrete Specimens
C 618-84 (CRD-C 255)	Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
D 75-82 (CRD-C 155)	Sampling Aggregates
E 329-77 (CRD-C 500)	Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction

2.4.3 Concrete Plant Manufacturer's Bureau (CPMB).

6th Edition (CRD-C 95) Concrete Plant Standards (Rev. Dec. 1, 1977)

2.4.4 Federal Specifications (Fed. Spec.).

TT-P-0035	Paint Cementitious Powder White and Colors (For Exterior and Interior Use)
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2.4.5 National Bureau of Standards (NBS) Handbook.

44	Specifications, Tolerance and Other Technical Requirements for Commercial Weighing and Measuring Devices (4th Edition 1971 with Replacement Sheets)
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2.4.6 U.S. Army Corps of Engineers Handbook for Cement and Concrete (CRD).

CRD-C 55-83	Concrete Mixer Performance
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2.4.6 U.S. Army Corps of Engineers Handbook for Cement and Concrete (CRD). (Cont'd)

CRD-C 100-75	Concrete Aggregate and Aggregate Sources and Selection of Material for Testing
CRD-C 104-80	Method of Calculation of Fineness Modulus of Aggregate
CRD-C 112-69	Surface Moisture in Aggregate by Water Displacement
CRD-C 143-62	Meters for Automatic Indication of Moisture in Fine Aggregate
CRD-C 400-63	Water for Use in Mixing or Curing Concrete
CRD-C 621-83	Nonshrink Grout

2.4.7 Louisiana Standard Specifications for Roads and Bridges, 1982 Edition, State of Louisiana Department of Transportation and Development (LDOTD).

1003.02	Aggregate for Portland Cement Concrete and Mortar
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3. QUALITY ASSURANCE.

3.1 Preconstruction Testing. The Board will sample and test the following:

Aggregates

At least 60 days in advance of concrete placement the contractor will notify the Chief Engineer of the source of materials (except aggregates) along with sampling location, brand name, type and quantity to be used in the manufacture of concrete. For concrete aggregates, the following information shall be submitted as above if the source is listed in SC-28; otherwise, submission of this information shall be made within 15 days after the Notice to Proceed (see 3D-3.1.1) is issued. Information pertaining to concrete aggregates shall include current quarry company name; past quarry company name(s) if any; nearest town; types and approximate quantities of materials to be used; quarry phone number; quarry representative to contact about sampling; and a detailed map and/or written description of how to get to the quarry and office if at different locations. Sampling and testing will be performed by and at the expense of the Board, except as otherwise specified. No material shall be used until notice has been given by the Chief Engineer that test results are satisfactory and all movement of materials after sampling shall be as directed.

3.1.1 Aggregates. If the Contractor proposes to furnish aggregates from a source previously qualified by the Board, samples consisting of not less than 500 pounds of each size coarse aggregate and 300 pounds of fine aggregate taken under the supervision of the Chief Engineer in accordance with CRD-C 100 shall be delivered to the Testing Laboratory within 15 days after Notice to Proceed. Sampling and shipping of samples shall be at the Contractor's expense. A maximum of 45 days will be required to complete evaluation of the aggregates. Testing by and at the expense of the Board will be in accordance with the applicable CRD or ASTM test methods. Tests to which aggregate may be subjected are specific gravity, absorption, Los Angeles abrasion, soundness in magnesium sulfate, petrographic analysis, freezing-and-thawing in concrete, alkali-aggregate reaction, organic impurities, and other tests that are necessary to demonstrate that the aggregate is of quality which is at least equivalent to those listed in SC-28.

3.1.2 Air-entraining admixture which has been in storage at the project site for longer than 6 months or which has been subjected to freezing will be retested at the expense of the Contractor when directed by the Chief Engineer and shall be rejected if test results are not satisfactory.

3.1.3 Water-reduction and retarding admixtures will be accepted based on compliance with applicable specification, except that 6-month and 1-year compressive strength requirements are waived.

3.2 Construction Testing by Board. The Board will sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. When the Contractor proposes to reduce concrete mixing time, uniformity tests at reduced mixing time will be made by the Board at the Contractor's expense. Samples of aggregates will be obtained at the point of batching. Concrete will be sampled in accordance with ASTM C 172. Slump and air content will be determined in accordance with ASTM C 143 and ASTM C 231, respectively. Compression test specimens will be made and cured in accordance with ASTM C 31 and compression test specimens tested in accordance with ASTM C 39. Samples for strength tests of each class of concrete placed each day will be taken not less than once each day, nor less than once each 150 cu. yd. of concrete, nor less than once for each 5,000 sq. ft. of surface area of one side of slabs or walls. Three specimens will be made from each sample, two will be tested at 28 days (90 days for concrete with flyash) for acceptance and one will be tested at 7 days for information. The acceptance test results will be the average of the strengths of the two specimens tested at 28 days (90 days for concrete with flyash).

4. EVALUATION AND ACCEPTANCE.

4.1 Concrete. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equal or exceed the required specified strength f'_c and no individual test result falls below the specified strength f'_c by more than 500 pounds per square inch. Structural analysis or additional testing may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient. Concrete work judged inadequate by structural analysis or by results of tests shall be reinforced with additional construction as directed by the Chief Engineer or shall be replaced at the Contractor's expense.

4.2 Construction Tolerances. Variation in alignment, grade and dimensions of the structures from the established alignment, grade and dimensions shown on the drawings shall be within the tolerances specified in the following tables:

TABLE 1

CONSTRUCTION TOLERANCES FOR REINFORCED CONCRETE STRUCTURES

(1) Variations from the plumb:	In any 10 feet of length -
a. In the lines and surfaces of columns piers, walls, and in arrises	1/4-inch Maximum for entire length - 1-inch
b. For exposed control-joint grooves, and other conspicuous lines	In any 20 feet of length - 1/4-inch Maximum for entire length - 1/2-inch
(2) Variation from the level or from the grades indicated on the drawings:	In any 10 feet of length - 1/4-inch
a. In slabs and in arrises	In any 20 feet of length - 3/8-inch Maximum for entire length - 3/4-inch
(3) Variation of the linear wall lines from established position in plan	In any 20 feet - 1/2-inch Maximum - 1-inch
(4) Variation in the sizes and locations of sleeves, and wall openings	Minus - 1/4-inch Plus - 1/2-inch

- (5) Variation in cross-sectional dimensions of columns, and beams and in the thickness of slabs and walls
 - Minus - 1/4-inch
 - Plus - 1/2-inch

- (6) Footings:
 - a. Variation in dimensions in plan
 - Minus - 1/2-inch
 - Plus - 2-inch
 - when formed or plus 3-inches when placed against unformed excavation
 - b. Misplacement of eccentricity
 - 2 percent of the footing width in the direction of misplacement but no more than - 2-inches
 - c. Reduction in thickness
 - Minus - 5 percent of specified thickness

4.3 Surface Requirements. The surface requirements for the classes of finish required by Section 3A-5.1 shall be as hereinafter specified. Allowable irregularities are designated "abrupt" or "gradual" for purposes of providing for surface variations. Offsets resulting from displaced, misplaced or mismatched forms, or sheathing, or by loose knots in sheathing, or other similar form defects, shall be considered "abrupt" irregularities. Irregularities resulting from warping, unplaneness or similar variations from planeness, or true curvature, shall be considered "gradual" irregularities. "Gradual" irregularities will be checked for compliance with the prescribed limits with a 5-ft. template, consisting of a straightedge for plane surfaces and a shaped template for curved or warped surfaces. In measuring irregularities, the straightedge or template may be placed anywhere on the surface in any direction, with the testing edge held parallel to the intended surface.

<u>Class of Finish</u>	<u>Irregularities (Max. Allowable)</u>	
	<u>Abrupt, inches</u>	<u>Gradual, inches</u>
A	1/8	1/4
D	1	1

4.4 Appearance. All concrete surfaces which are permanently exposed shall be cleaned if stained or otherwise discolored, by a method which does not harm the concrete and which is approved by the Chief Engineer.

5. SUBMITTALS.

5.1 Test Reports.

5.1.1 Aggregates. Test reports of aggregates shall be submitted from a laboratory complying with ASTM E 329. Test to be conducted shall be those required to demonstrate that the aggregate conforms to the requirements of 3D-6.2 and those tests required in 3D-7.5. No aggregate shall be used until notice of acceptance has been given by the Chief Engineer.

5.1.2 Concrete mixture proportions shall be submitted for approval. The proportions of all ingredients and nominal maximum coarse aggregate size that will be used in the manufacture of each quality of concrete shall be stated. Proportions shall indicate weight of cement, fly ash, water and weights of aggregates in a saturated surface-dry condition. The submission shall be accompanied by test reports from a laboratory complying with ASTM E 329 attesting proportions thus selected will produce concrete of the qualities indicated. No substitution shall be made in the source or type of materials used in the work without additional tests to show that the new materials and quality of concrete are satisfactory.

5.1.3 Cement and Flyash will be accepted on the basis of manufacturer's certification of compliance, accompanied by mill test reports that materials meet the requirements of the specification under which it is furnished. Certification and mill test reports shall identify the particular lot furnished. No cement or flyash shall be used until notice of acceptance has been given by the Chief Engineer. Sixty (60) days will be required for the approval of flyash if the Contractor elects to use it. Cement and flyash will be subject to check testing from samples obtained at the mill, at transfer points or at the project site, as scheduled by the Chief Engineer and such sampling will be by or under the supervision of the Board at its expense. Material not meeting specifications shall be promptly removed from the site of work.

5.1.4 Water. The name of the source of mixing and curing water (and documentation that mixing water meets CRD-C 400, if undrinkable) shall be submitted for review by the Chief Engineer for conformance with 3D-6.4.

5.2 Manufacturer's Certificate.

5.2.1 Air-entraining admixture shall be certified for compliance with all specification requirements, except that 6-month and one-year compressive strength requirements are waived.

5.2.2 Water-reducing admixture shall be certified for compliance with all specification requirements.

5.3 Review of Plant, Equipment and Methods.

5.3.1 Batch Plant. Details of the data on concrete plant shall be submitted for review by the Chief Engineer for conformance with 3D-8.1 and 3D-8.2.

5.3.2 Mixers. The make, type and capacity of concrete mixers proposed for mixing concrete shall be submitted for review by the Chief Engineer for conformance with 3D-8.1 and 3D-8.3.

5.3.3 Conveying Equipment. The methods and equipment for transporting, handling, and depositing the concrete shall be submitted for review by the Chief Engineer for conformance with 3D-10.

5.3.4 Placing. All placing equipment and methods shall be submitted for review by the Chief Engineer for conformance with 3D-11.

5.3.5 Joint Clean-up. The method and equipment proposed for joint clean-up shall be submitted for review by the Chief Engineer for conformance with 3D-9.1. Method of waste disposal for any method proposed for joint clean-up shall be approved by the Contracting Officer.

5.3.6 Curing. The curing medium and methods to be used shall be submitted for review by the Chief Engineer for conformance with 3D-14.

5.3.7 Cold-weather Requirements. If concrete is proposed to be placed under cold weather conditions the materials, methods and protection proposed to accomplish it in accordance with the requirements of 3D-11.3 and 3D-14.3 shall be approved by the Chief Engineer.

5.3.8 Hot-weather Requirements. If concrete is proposed to be placed under hot weather conditions the materials and methods proposed to accomplish it in accordance with the requirements of 3D-11.4 and 3D-14.4 shall be approved by the Chief Engineer.

PART 2 - PRODUCTS

6. MATERIALS.

6.1 Cement and Flyash shall be portland cement or portland-pozzolan cement or portland cement in combination with flyash and shall conform to the appropriate specifications listed below:

6.1.1 Portland Cement. ASTM C 150, Type I low alkali or Type II low alkali including false set requirement except that the maximum amount of C₃A (Tricalcium Aluminate) in Type I cement shall be 15%.

6.1.2 Portland-Pozzolan Cement - ASTM C 595 Type IP except; change table 3 ASTM C 595, Pozzolanic strength, minimum, psi from 800 to 900 and (MPa) from (5.5) to (6.2) and use 2-inch cubes (see ASTM C 109) instead of cylinders.

6.1.3 Flyash. Flyash shall conform to ASTM C 618 Class C or F, except for changes as follows:

- Tables 1 and 2 of ASTM C 618 shall be changed as follows:

TABLE 1

	Mineral Admixture Class		
	N	F	C
Loss on ignition, maximum, percent	8.0	6.0	6.0*

* ASTM C 618 Value, unchanged.

TABLE 2

	Mineral Admixture Class		
	N	F	C
Pozzolanic activity index. a. with lime, at 7 days min, psi (kPa)	900 (6200)	900 (6200)	900 (6200)

a. Pozzolanic activity index with lime shall be determined using 2-inch cubes.

6.2 Aggregates shall be produced from the sources in SC-28 or from another source when approved in accordance with SC-28 and 3D-3.1. Fine aggregate shall conform to the grading requirements of ASTM C-33 or Section 1003, paragraph 1003.02(b) of Louisiana Department of Transportation and Development (LDOTD). Coarse aggregate shall conform to the grading requirements of ASTM C 33 or LDOTD 1003.02(c) Grade B as shown in the following table:

OPTION

1	2	3	4
ASTM #467 (1-1/2" NMS)	LDOTD Grade B (1-1/2" NMS)	ASTM #54 (1" NMS)	LDOTD Grade A (1" NMS)

Grading requirements of 3/4" NMS coarse aggregate shall conform to ASTM C 33 size No. 67. The aggregate grading standards selected by the Contractor shall include the 3/8 in. sieve for all coarse aggregate submittals and tests and the No. 8 sieve for all fine aggregate submittals and tests. The nominal maximum size shall be as listed in 3D-7.2.

6.3 Admixtures to be used, when required or permitted shall conform to the appropriate specification listed below:

6.3.1 Air-entraining Admixture. ASTM C 260.

6.3.2 Water-reducing or retarding admixtures. ASTM C 494, Type A, B or D.

6.4 Water for mixing shall be fresh, clean and drinkable, except that undrinkable water may be used if it meets the requirements of CRC-C 400. Water for curing shall not contain any substance that is injurious to the concrete.

7. PROPORTIONING.

7.1 Quality and Location. Concrete of various qualities indicated and as required under other sections shall be proportioned for use in various structures or portions of structures as follows:

7.1.1 Strength. Specified compressive strength f'_c shall be as follows:

Concrete without Pozzolan (Fly Ash)	Structure or Portion
Compressive Strength @ 28 days, psi	of Structure
2500	4" stabilization slab
3000	All other structures
Concrete with Pozzolan (Fly Ash)	Structure or Portion
Compressive Strength @ 90 days, psi	of Structure
2500	4" stabilization slab
3000	All other structures

7.1.2 Maximum Water - Cement Ratio. Maximum water cement ratio shall be as follows:

<u>Water-Cement Ratio, by wt.</u>	Structure or Portion
	of Structure
0.64	4" stabilization slab
0.58	All other structures

7.2 Nominal Maximum size coarse aggregate shall be 1 or 1-1/2 inches except 3/4-inch nominal maximum size coarse aggregate shall be used when any of the following conditions exist: the narrowest dimension between sides of forms is less than 7-1/2 inches, the depth of the slab is less than 4-1/2 inches or when the minimum clear spacing between reinforcing or between reinforcing steel and sheet piling is less than 2 inches. The nominal maximum size aggregate (NMSA) and the maximum size aggregate (MSA) shall be as defined in ACI 116R.

7.3 Air Content as determined by ASTM C 231 shall be 5.0+ 1.5 percent except that when the nominal maximum size coarse aggregate is 3/4-inch it shall be 6.0+ 1.5 percent.

7.4 Slump. The slump as determined by ASTM C-143 and shall not depart more than 1-1/2 inches from that stipulated below. Where super plasticizing admixtures are used, the slump determined before addition of the admixture shall not exceed that stipulated.

<u>Structural Element</u>	<u>Slump, inches</u>
All construction	3

7.5 Concrete Proportioning. Trial design batches and testing requirements for various qualities of concrete specified shall be the responsibility of the Contractor. Samples of approved aggregates shall be obtained in accordance with the requirements of ASTM D 75. Samples of materials other than aggregate shall be representative of those proposed for the project and shall be accompanied by manufacturer's test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies and air content suitable for the work shall be made based on ACI Standard 211.1, using at least three different water-cement ratios which will produce a range of strength encompassing those required for the work. Trial mixtures shall be designed in accordance with the procedure in ACI 211.1 (CRD-C 99), Chapter 5, using the absolute volume basis for determining the required amount of fine aggregate. If flyash is to be used it will be limited to a maximum of 25 percent by absolute volume of the total cementitious material. Format for submittal of proportioning shall be in accordance with ACI 211.1, paragraph 6.3.7.2. The Contractor shall provide a copy of the section of these specifications entitled STRUCTURAL SITECAST CONCRETE to the laboratory that performs the concrete proportioning at least 60 days (120 days when pozzolan is used) prior to the date when the first concrete will be placed for this project. Representative samples for all concrete materials proposed for this project shall also be delivered to the laboratory that performs the concrete proportioning at least 60 days (120 days when pozzolan is used) in advance of the time when concrete placement is begin for the project. When all of these materials have been delivered, the name, address, and phone number of this laboratory and a list of the sources and types of all concrete materials shall be submitted to the Chief Engineer. Trial mixtures shall be designed for maximum permitted slump and air content. The dry rodded weight per cubic foot of the coarse aggregate determined according to ASTM C 29 using the rodding procedure (para. 8), the fineness modulus of the fine aggregate determined according to CRD-C 104, and the specific gravity and absorption of fine and coarse aggregate determined by ASTM C 128 and ASTM C 127, respectively shall also be reported. The slump, air

content, yield and temperature of concrete in each trial batch shall be reported. For each water-cement ratio at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192. They shall be tested at 7 and 28 days (7, 28 and 90 days if pozzolan is used) in accordance with ASTM C 39. From these test results a curve shall be plotted and submitted showing the relationship between water-cement ratio and strength. The concrete proportioning report shall be submitted to the Chief Engineer at least 30 days in advance of the time when the first concrete will be placed for this project.

7.6 Average Strength. For each portion of the structure, proportions shall be selected so that the maximum permitted water-cement ratio is not exceeded and so as to produce an average strength f_{cr} exceeding the specified strength f'_c by the amount indicated below. Where the production facility has a standard deviation record determined in accordance with ACI 214, based on 30 consecutive strength tests of similar mixture proportions as proposed, obtained within one year of the time when concrete placing is expected, it shall be used in selecting average strength. The average strength used as the basis for selecting proportions shall exceed the specified strength f'_c by at least

350 psi if standard deviation is less than 300 psi

550 psi if standard deviation is 300 to 450 psi

750 psi if standard deviation is 450 to 600 psi

900 psi if standard deviation is 600 to 750 psi

If the standard deviation exceeds 750 psi or if a standard deviation record is not available, proportions shall be selected to produce an average strength at least 1,000 psi greater than the specified strength.

PART 3 - EXECUTION

8. PRODUCTION OF CONCRETE.

8.1 Capacity. The batching and mixing equipment shall have a capacity of at least 30 cubic yards per hour.

8.2 Batching Plant shall conform to the requirements of the Concrete Plant Standards of CPMB (CRD-C 95) and as specified herein; rating plates attached to batch plant equipment are not required.

8.2.1 Equipment. The batching controls shall be semi-automatic or automatic. The semi-automatic batching system shall be provided with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerances. Separate bins or compartments shall be

provided for each size group of aggregate, cement, and flyash. Aggregate shall not be weighed in the same batcher with cement or flyash. If both cement and flyash are used they may be batched cumulatively provided portland cement is measured first. If measured by weight, water shall not be weighed cumulatively with another ingredient. Water batcher filling and discharging valves shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. An accurate and visual mechanical device for measuring and dispensing each admixture shall be provided. Each dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and discharged automatically in a manner to obtain uniform distribution throughout the batch in the specified mixing period. Where use of truck mixers make this requirement impracticable, the admixture dispensers shall be interlocked with the sand batcher. Admixtures will not be combined prior to introduction in water or sand. The plant shall be arranged so as to facilitate the inspection of all operations at all times. Suitable facilities shall be provided for obtaining representative samples of aggregates from each bin or compartment.

8.2.2 Scales. The weighing equipment shall conform to the applicable requirements of NBS Handbook 44, except that the accuracy shall be plus or minus 0.2 percent of scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. The tests shall be made at the frequency required in 3D-16.5.4 and in the presence of a Board inspector.

8.2.3 Batching Tolerances.

8.2.3.1 Weighing Tolerances. Whichever of the following tolerances is greater shall apply, based on required scale reading.

<u>Material</u>	<u>Percent of Required Weight</u>	<u>Percent of Scale Capacity</u>
Cement & Flyash	<u>+1</u>	<u>+0.3</u>
Aggregate	<u>+2</u>	<u>+0.3</u>
Water	<u>+1</u>	<u>+0.3</u>
Admixture	<u>+3</u>	<u>+0.3</u>

8.2.3.2 Volumetric Tolerances. For volumetric batching equipment the following tolerances shall apply to the required volume of material being batched:

Water: Plus or minus 1 percent.

Admixtures: Plus or minus 3 percent.

8.2.4 Moisture Control. The plant shall be capable of ready adjustment to compensate for the varying moisture contents of the aggregates, and to change the weights of the materials being batched. An electric moisture meter complying with the provisions of CRD-C 143 shall be provided and be operating for measuring of moisture in the fine aggregate. The sensing element shall be arranged so that measurement is made near the batcher charging gate of the sand bin or in the sand batcher.

8.3 Mixers.

8.3.1 General. The mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed designated on the manufacturer's data plate. The mixers shall be maintained in satisfactory operating condition, and the mixer drum shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

8.3.2 Concrete plant mixers shall be tilting, non-tilting, horizontal shaft or vertical-shaft type and shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to 3D-8.3.2.1.

8.3.2.1 Mixing Time and Uniformity. In the absence of uniformity data for concrete mixers, the mixing time for each batch after all solid materials are in the mixer shall be one minute for mixers having a capacity of one cubic yard, provided that all of the mixing water is introduced before one-fourth of the mixing time is elapsed. For mixers of greater capacity, this minimum time shall be increased 15 seconds for each additional cubic yard or fraction thereof. These mixing times are predicated on operation at designated speed and proper introduction of materials into the mixer. The mixing time will be increased to secure the required uniformity when the average variability index for the tests performed in accordance with 3D-16.5.12.1 is less than any of the following uniformity requirements:

<u>Test</u>	<u>Average Variability Index</u>
Water content, % by wt.	91.5
Coarse aggregate content, % by wt.	90.5
Unit - weight of air-free mortar, % by wt.	98.5
Cement content of dried mortar, % wt.	82.5

The mixing time may be reduced, when requested by the Contractor, to the minimum time required to meet all the uniformity requirements. Mixer performance tests in accordance with CRD-C 55 at reduced mixing times will be performed by the Board at the Contractor's expense.

8.3.3 Truck Mixers. Truck mixers, the mixing of concrete therein, and concrete uniformity, shall conform to the requirements of ASTM C-94. A truck mixer may be used either for complete mixing (transmit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it will be possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed. Truck mixers shall not be used to mix or to agitate concrete with greater than 1-1/2-inch nominal maximum size aggregate.

9. PREPARATION FOR PLACING.

9.1 Construction Joints. Concrete surfaces to which other concrete is to be bonded shall be prepared for receiving the next lift or adjacent concrete by cleaning with either wet sandblasting, high pressure water jet, or other approved method; however; approved wet sandblasting equipment shall be provided.

9.1.1 High-Pressure Water Jet. A stream of water under pressure of not less than 3000 psi may be used for cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse aggregate particles.. Where the cleaning occurs more than two days prior to placing the next lift or where the work in the area subsequent to the cleaning causes dirt or debris to be deposited on the surface, the surface shall be cleaned again as the last operation prior to placing the next lift. If the water jet is incapable of a satisfactory cleaning, the surface shall be cleaned by wet sandblasting.

9.1.2 Wet Sandblasting. When employed in the preparation of construction joints, wet sandblasting shall be performed as the final operation completed before placing the following lift. The operation shall be continued until all accumulated laitance, coatings, stains, debris, and other foreign materials are removed. The surface of the concrete shall then be washed thoroughly to remove all loose material. The surface shall again be washed just prior to placing the succeeding lift.

9.1.3 Waste Disposal. The method used in disposing of waste water employed in cutting, washing and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. Method of disposal shall be subject to approval.

9.2 Embedded Items. Before placing concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Embedded items shall be free of oil and other foreign matter such as loose coatings or rust, paint and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into the voids.

10. CONVEYING.

10.1 General. Concrete shall be conveyed from mixer to forms as rapidly as practicable and within the time interval in 3D-11.2 by methods which will prevent segregation or loss of ingredients. Any concrete transferred from one conveying device to another shall be passed through a hopper which is conical in shape and shall not be dropped vertically more than 5 feet, except where suitable equipment is provided to prevent segregation and where specifically authorized. Telephonic or other satisfactory means of rapid communication between the mixing plant and the forms in which concrete is being placed shall be provided and available for use by Board inspectors.

10.2 Buckets. The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least 5 times the nominal maximum size aggregate and the area of the gate opening shall be not less than two-square feet. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically or hydraulically operated except for buckets larger than 2 cubic yards shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

10.3 Trucks. Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C-94. Non-agitating equipment may be used for transporting plant mixed concrete over a smooth road when hauling time is less than 15 minutes. Bodies of non-agitating equipment shall be smooth, watertight, metal containers equipped with gates that will permit the discharge of the concrete. Covers shall be provided for protection against the weather.

10.4 Chutes. When concrete can be placed directly from a truck mixer, agitator or non-agitating equipment, the chutes attached to this equipment may be used. A discharge deflector shall be used when required by the Chief Engineer. Separate chutes and other similar equipment will not be permitted for conveying concrete except when specifically approved.

10.5 Belt Conveyors. Belt conveyors may be used when approved. Such conveyors shall be designed and operated to assure to uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing.

10.6 Pump Placement. Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure type. The pipeline shall be rigid steel pipe or heavy duty flexible hose. The inside diameter of the pipe shall be at least three times the nominal maximum size coarse aggregate in the concrete mixture to be pumped but not less than 4 inches. The maximum size coarse aggregate will not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the concrete pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms. Except for the above requirements, pump placement will be in accordance with the latest edition of ACI 304.2R.

11. PLACING.

11.1 General. Concrete placement will not be permitted when, in the opinion of the Chief Engineer, weather conditions prevent proper placement, consolidation or curing. Concrete shall be deposited as close as possible to its final position in the forms, and in so depositing there shall be no vertical drop greater than 5 feet. Concrete placements of greater than 5 feet in height shall not be allowed except where suitable means is provided to prevent aggregate segregation splatter on architectural forms, and where specifically authorized by the Chief Engineer. Depositing of the concrete shall be so regulated that it may be effectively consolidated in horizontal layers 1-1/2 feet or less in thickness with a minimum of lateral movement. The amount deposited in each location shall be that which can be readily and thoroughly consolidated. The surfaces of construction joints shall be kept continuously wet for the first twelve hours during the twenty-four hour period prior to placing concrete. Free water shall be removed prior to placement of concrete. Sufficient placing capacity shall be provided so that concrete placement can be kept plastic and free of cold joints while concrete is being placed. For concrete to have textured form liner finish, concrete placements shall be planned so as not to exceed 20 minutes between lifts without retarding admixture and 30 minutes between lifts with a retarding admixture.

11.2 Time Interval Between Mixing and Placing. Concrete shall be placed within thirty minutes after it has been mixed except when conveyed by agitating equipment. When concrete is truck mixed or when a truck mixer or agitator is used for transporting concrete mixed by a concrete plant mixer, the concrete shall be delivered to the site of work and discharge shall be completed within 1-1/2 hours after introduction of the cement to the aggregates except when the concrete temperature exceeds 85°F, the discharge shall be completed within 45 minutes. When the length of haul makes it impossible to deliver truck mixed concrete within these time limits, batching of cement and a portion of the mixing water shall be delayed until the truck mixer is at or near the construction site. Not more than 80 percent of the water and all other materials except cement shall be batched at the distant batch plant and transported to the cement batcher without mixing. Concrete shall be placed within 15 minutes after it has been discharged.

11.3 Cold-Weather Placing. Concrete shall not be placed without a procedure approved in accordance with 3D-5.3.8 when the concrete is likely to be subjected to freezing temperatures before the expiration of the curing period. The ambient temperature of the space adjacent to the concrete placement and surfaces to receive concrete shall be maintained at not less than 40°F. The placing temperature of the concrete having a minimum dimension of 12" or less shall be between 60° and 75°F. The placing temperature of the concrete having a minimum dimension greater than 12 inches shall be between 50° and 75°F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperatures. Materials entering the mixer shall be free from ice, snow or frozen lumps. Salt, chemicals or other materials shall not be mixed with the concrete to prevent freezing.

11.4 Hot-Weather Placing. Concrete shall be properly placed and finished with approved procedures in accordance with 3D-5.3.8. The concrete placing temperature shall not exceed 90°F. Cooling of the mixing water and/or aggregates will be required to obtain an adequate placing temperature. An approved retarder will be used to facilitate placing and finishing when the placing temperature reaches or exceeds 85°F. Steel forms and reinforcement shall be cooled prior to concrete placement when steel temperatures are greater than 120°F. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete placing temperature.

11.5 Concrete on Earth Foundations. Earth surfaces upon which concrete is to be placed shall be clean, damp and free from frost, ice, and standing or running water. Prior to placing concrete, the earth foundation shall have been satisfactorily compacted in accordance with the provisions of Section 2D.

11.6 Consolidation. Immediately after placing, each layer of concrete shall be consolidated by internal vibrating equipment. Vibrators will not be used to transport concrete within the forms. Hands spading may be required if necessary with internal vibration along formed surfaces permanently exposed to view. A spare vibrator shall be kept on the job site during all concrete placing operations. Form or surface vibrators shall not be used unless specifically approved. Vibrators of the proper size, frequency and amplitude shall be used for the type of work being performed in conformance with the following requirements.

<u>Application</u>	<u>Head Diameter (inches)</u>	<u>Frequency VPM (Min)</u>	<u>Amplitude (in.)(Min)</u>
Thin walls, beams, etc.	1-1/4 to 2-1/2	9000 to 13500	0.02 to 0.04
General construction	2 to 3-1/2	8000 to 12000	0.025 to 0.05

The frequency and amplitude shall be within the limits indicated in the table above when determined in accordance with 3D-16.3.9. All walls exposed to view which include a form liner finish shall be consolidated with high cycle (180 vs 60 cycle) vibrators with 2-1/2 to 2-5/8 inch diameter heads and otherwise complying with the vibrators to be used in general construction. 60 cycle motors are not acceptable. The vibrator shall be inserted vertically at uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator. The vibrator shall penetrate rapidly to the bottom of the layer and at least inches into the preceding layer if such exists. It shall be held stationary until there is a general cessation in escape of large bubbles of entrapped air at the surface of the concrete (generally for 5 to 15 seconds) and then shall be withdrawn slowly at about 3 inches per second with an up and down type motion. A minimum of two vibrators shall be used in wall construction. One vibrator shall be used to level the mix. The second vibrator shall be used to consolidate the mass and minimize surface blemishes.

12. REPAIR OF SURFACE DEFECTS. Within 24 hours after form removal, all fins and loose materials shall be removed; Surface defects including tie holes shall be remedied; and all honeycombed and other defective concrete shall be repaired. For areas with a form liner finish or other architectural finish patching shall be delayed until the concrete has cured and a color can be determined. All unsound concrete shall be removed from defective areas. The concrete shall be kept moist until the repair work is complete. Defective areas larger than 36 square inches and deeper than any reinforcing steel or 4 inches shall be delineated in a rectangular shape by a saw cut a minimum depth of

1-inch and repaired with concrete replacement. Minor honeycomb and holes left by the removal of tie rods in all surfaces not to receive additional concrete shall be reamed or chipped and filled with dry pack mortar. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut. As determined by trial mixtures, the cement used in the mortar or concrete for all surfaces permanently exposed to view shall be a blend of portland cement and white cement properly proportioned by weight so that the final color when cured will be the same as adjacent concrete. Temperature of the concrete, ambient air, replacement concrete or mortar during remedial work including curing shall be above 50°F. The prepared area shall be dampened, brush-coated with a neat cement grout or with an approved epoxy resin, and filled with mortar or concrete. The mortar shall consist of 1 part cement to 2-1/2 parts fine aggregate. The quantity of mixing water shall be the minimum necessary to obtain a uniform mixture. The mortar shall be remixed without addition of water until it obtains the stiffest consistency that will permit placing. Mortar shall be thoroughly compacted in place and struck off to adjacent concrete. Replacement concrete shall be drier than the usual mixture and thoroughly tamped into place and finished. Forms shall be used if required. Metal tools shall not be used to finish permanently exposed surfaces. The patched areas shall be cured for seven days. All areas to be patched, materials and methods used shall be approved by the Contracting Officer prior to commencement of patching.

13. FINISHING UNFORMED SURFACES.

13.1 General. The ambient temperature of spaces adjacent to surfaces being finished shall be not less than 50°F. All unformed surfaces that are not to be covered by additional concrete or backfill shall be finished to the elevation shown on the drawings. Surfaces to receive additional concrete or backfill shall be brought to elevation shown on the drawings and left true and regular. Exterior surfaces shall be sloped for drainage unless shown on the drawing or as directed. Joints shall be carefully made with a jointing tool. The finished surfaces shall be protected from stains or abrasions. Surfaces or edges likely to be injured during the construction period shall be protected from damage. Tolerance for a screeded finish shall be 3/8-inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Tolerance for a floated finish shall be 1/4-inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Tolerance for a troweled finish shall be true planes within 1/8-inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Tolerance for a troweled finish shall be true planes within 1/8-inch in 10 feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

13.2 Float Finish. All unformed surfaces of concrete that are not be covered by additional concrete or backfill, shall have a float finish unless a steel trowel finish is specified. Surfaces shall be screeded and darbied or bullfloated to bring the surface to the required finish level with no coarse aggregate visible. No cement or mortar shall be added to the surface during the finishing operation, and no finishing operation shall be conducted until the water sheen has disappeared. The concrete, while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be floated to a true and even plane. Floating may be performed by use of hand or power driven equipment. Hand floats shall be made of magnesium or aluminum.

13.3 Trowel Finish. A steel trowel finish shall be applied to the top elevations of I-Walls, T-Walls and columns. Concrete surfaces shall be finished with a float finish and after surface moisture has disappeared, the surface shall be steel-troweled to a smooth, even, dense finish free from blemished including trowel marks.

13.4 Broom Finish shall be applied to the wearing surface of the floodgate opening slabs. The concrete surface shall be finished with a float finish and trowel finish. The troweled susrface shall be broomed with a fiber-bristle brush in a direction transverse to that of the main traffic.

14. CURING AND PROTECTION.

14.1 General. All concrete shall be cured by an approved method for the period of time given below:

Type I portland cement or	
Type IP portland pozzolan cement	7 days
Type II portland cement or	
Type I or II Portland Cement blended with pozzolan	14 days

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the placement site prior to start of concrete placement. Concrete shall be protected from the damaging effects of rain for 12 hours, flowing water for 14 days and direct rays of the sun for 3 days. All concrete shall be adequately protected from damage. No fire or excessive heat shall be permitted near or in direct contact with concrete at any time.

14.2 Moist Curing: Moist-cured concrete shall be maintained continuously (not periodically) wet for the entire curing period. If water or curing materials used stain or discolor

concrete surfaces which are to be permanently exposed, they shall be cleaned as required in 3D-4.4. When wooden form sheathing is left in place during curing, the sheathing shall be kept wet at all times. Horizontal surfaces shall be cured by ponding, by covering with a minimum uniform thickness of 2 inches continuously saturated sand, or by covering with saturated non-staining burlap.

14.3 Cold Weather. When the mean daily outdoor temperature is less than 40°F, the temperature of the concrete shall be maintained between 50°F and 70°F for required curing period. In addition, during the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 25°F as determined by observation of ambient and concrete temperatures indicated by suitable thermometers furnished by the Board as required and installed adjacent to the concrete surface and 2 inches inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor at such locations as may be directed. Curing compounds shall not be used on concrete surfaces which are maintained at curing temperature by use of free steam.

14.4 Hot Weather. When the rate of evaporation of surface moisture, as determined by use of Fig. 2.1.5 or ACI 305, may reasonably be expected to exceed 0.2 lb per sq. ft. per hour, provision for windbreaks, shading, fog spraying, or wet covering with a light colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow.

15. FINISHING FORMED SURFACES.

15.1 General. Surfaces, unless other type of finish is specified, shall be left with the texture imparted by the forms except defective surfaces shall be repaired in accordance with 3D-12. Other types of finishes shall be applied to the following structures or portions of structures:

<u>Type of Finish</u>	<u>Structure or Portion of Structure</u>
Waterproof Finish	As indicated on drawings
Bush-hammered	As indicated on drawings

Unless painting of surfaces is required, uniform color shall be maintained by use of only one mixture design without changes in materials or proportions for any structure or portion of structure which is exposed to view or on which a special finish is required. The form panels used to produce the finish shall be orderly in arrangement, with joints between panels planned in approved relation to opening, building corners and other

architectural features. Forms shall not be reused if there is any evidence of surface wear or defects which would impair the quality of the surface.

15.2 Waterproof Finish. This type of finish shall be applied where specified or as noted on the drawings. As approved by the Contracting Officer and after all required patching, cleaning and correction of major imperfections have been completed, the concrete surface shall be given a waterproof finish as hereinafter described. The finish shall not be applied before the initial 72-hour moist curing period is complete. The temperature of the air adjacent to the surface shall be not less than 50°F for 24 hours prior to and 24 hours following the application of the finish. If the temperature of the air adjacent to the surface is above 90°F, the surface shall be cooled prior to the application of the finish by hosing with clean water until it reaches a temperature of 85°F. The 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.

The surface to be finished must be structurally sound, clean and free of dirt, form marks, loose mortar particles, paint, films, protective coatings, efflorescence, laitance, etc. The waterproof finish shall consist of dampening the surface ahead of the cementitious paint application with clean water. The cementitious paint shall be prepared by mixing a minimum of 25 pounds of paint powder (color, pearl gray), conforming to Fed. Spec. TT-P-0035, per gallon of mixing liquid. The mixing liquid shall contain one acrylic bonding agent to three parts of clean water. The paint shall be applied in a minimum of two brush coats. Each coat shall be applied at a rate of 2 pounds of paint per square yard of surface. The applied coating shall be uniform, completely filling all pits, air bubbles, and surface voids. Immediately after the waterproof treatment has set, the surface shall be continuously moist cured for 72 hours.

15.3 Bush-hammer Finish. The thoroughly cured concrete shall be dressed with electric, air, or hand tools to a uniform texture, and shall be bush-hammered at the rate of 1/4 sq. ft. per minute.

16. RESERVED.

17. CONTRACTOR QUALITY CONTROL.

17.1 General. The Contractor shall perform the inspection and tests described in 3D-17.2 and based upon the results of these inspections and tests, he shall take the action required in 3D-17.3. Reports shall be submitted as required in 3D-17.3 and 3D-17.4.

17.2 Inspection Details and Frequency of Testing.

17.2.1 Fine Aggregate.

17.2.1.1 Grading. At least once during each shift in which concrete is being delivered, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and CRD-C-104, respectively, for the fine aggregate or for each fine aggregate, if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits.

17.2.1.2 Moisture Content. When in the opinion of the Chief Engineer _____ the electric moisture meter is not operating satisfactorily, there shall be at least four tests for moisture content in accordance with either ASTM C 70, C 566, or CRD-C 112 during each 8-hour period of mixing plant operation. The times for the tests shall be selected randomly within the 8-hour period. Additional tests shall be made whenever the slump is shown to be out of control or excessive variation in workability is reported by the placing foreman. When the electric moisture meter is operating satisfactorily, at least two direct measurements of moisture content shall be made per week to check the calibration of the meter.

17.2.2 Coarse Aggregate.

17.2.2.1 Grading. At least once during each shift concrete is being delivered, there shall be a sieve analysis in accordance with ASTM C 136 for each size group of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor is responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken shall show the results of the 5 most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than at the batch plant bins to allow for degradation during handling.

17.2.2.2 Moisture Content. A test for moisture content of each size of coarse aggregate shall be made at least once a shift. When two consecutive readings for smallest size coarse aggregate differ by more than 0.5 percent, frequency of testing shall be increased to that specified for fine aggregate in 3D-17.2.1.2.

17.2.3 Deleterious Substances. When in the opinion of the Chief Engineer _____, a problem exists in connection with deleterious substances in fine or coarse aggregates, tests shall be made in accordance with ASTM C 33. Testing frequency shall be not less than one per week.

17.2.4 Scales.

17.2.4.1 Weighing Accuracy. The accuracy of the scales shall be checked by test weights at least once a month for conformance with the applicable requirement of 3D-8.2.2. Such tests shall also be made whenever there are variations in properties of the fresh concrete which could result from batching errors.

17.2.4.2 Batching Accuracy. Once a week the accuracy of each batching device shall be checked during a weighing operation by noting and recording the required weight, and the actual weight batched.

17.2.5 Batch-Plant Control. When the concrete plant is operating the measurement of all constituent materials including cement, flyash, each size of aggregate, water and admixtures shall be continuously controlled. The aggregate weights and amount of added water to compensate for free moisture in the aggregates shall be adjusted as necessary. The amount of air-entraining admixture shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of flyash used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubic yard, amount of water as free moisture in each size of aggregate, and the batched aggregate and water weights per cubic yard for each class of concrete batched during plant operation. Two copies of this report shall be submitted once per week to the Chief Engineer. This report shall also include gradation and moisture test results.

17.2.6 Concrete.

17.2.6.1 Air Content. At least two tests for air content shall be made on randomly selected batches of each class of concrete during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Board inspector. Tests shall be made in accordance with ASTM C 231. The average of each set of two tests shall be plotted on a control chart on which the average is set at 5.0 percent and the upper and lower control limits at 6.0 and 4.0 percent respectively. The range shall be plotted on a control chart on which the upper control limit is 2.0 percent. For concrete having a nominal maximum aggregate size of 3/4-inch, the average shall be set at 6.0 percent and the lower and upper control limits at 5.0 and 7.0 percent respectively.

16.5.6.2 Slump. At least four slump tests shall be made on randomly selected batches of each mixture of concrete during each day's concrete production in accordance with ASTM C 143.

Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Board inspector. The average of each set of two tests shall be plotted on a control chart on which the upper and lower limits are set 1.0 inch above and below the slump given in the table found in Section 3D-7.4. The range shall be plotted on a control chart on which the upper control limit is two inches.

17.2.7 Preparation for Placing. Foundation or construction joints, forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Chief Engineer it is ready to receive concrete. The results of each inspection shall be reported in writing.

17.2.8 Placing. The placing foreman shall supervise all placing operations, shall determine that the correct quality of concrete or grout is placed in each location as directed by the Chief Engineer and shall be responsible for measuring and recording concrete temperatures, ambient temperature, weather conditions, time of placement, yardage placed, and method of placement.

17.2.9 Vibrators. The frequency and amplitude of each vibrator shall be determined prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made when a vibrator does not appear to be adequately consolidating the concrete. A vibrating reed tachometer or resonant reed tachometer shall be used for checking frequency. The frequency shall be determined while the vibrator is operating in concrete holding the tachometer against the upper end of the vibrator while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. For flexible shaft electric and air vibrators, two measurements shall be taken, one near the tip and another near the upper end of the vibrator head, and these results averaged. For other types of internal vibrators, measurements shall be taken in accordance with ACI 309. A visual effect scales (optical wedge), as shown in ACI 309 or obtained from the vibrator manufacturer, shall be attached to the vibrator where required with the "V" parallel to the axis of the vibrator. The make, model, type and size of the vibrator and frequency and amplitude results shall be reported in writing.

17.2.10 Curing.

17.2.10.1 Moist Curing. At least once each shift an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

17.2.11 Protection. At least once each shift an inspection shall be made of all areas subject to cold weather protection. Deficiencies shall be noted. During removal of protection, measurement of concrete and ambient temperature shall be at least hourly.

17.2.12 Mixer Uniformity.

17.2.12.1 Concrete Plant Mixer. At the start of concrete placing, and at least once every three months when concrete is being placed, uniformity of concrete shall be determined. The initial and every fourth test shall be performed in accordance with regular test of CRD-C 55. Other tests shall be performed in accordance with abbreviated tests of CRD-C 55. Whenever adjustments in mixer or increase mixing times are necessary because of failure of any mixer to comply, the mixer shall be retested after adjustment. For complete testing three different batches of concrete shall be tested. For abbreviated tests one batch shall be tested. Results of tests shall be reported in writing.

17.2.12.2 Truck Mixers. At the start of concrete placing and at least once every three months when concrete is being placed, uniformity of concrete shall be determined in accordance with ASTM C 94. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of blades may be regarded as satisfactory. Results of tests shall be reported in writing.

17.3 Action Required.

17.3.1 Fine Aggregate.

17.3.1.1 Grading. When the amount passing any sieve is outside the specification limits, the fine aggregate shall immediately be resampled and retested. If there is another failure on any sieve, the fact shall immediately be reported to the Chief Engineer and immediate steps shall be taken to rectify the situation.

17.3.1.2 Moisture Content. Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, the scale settings for the fine aggregate batcher and water batcher shall be adjusted directly or by means of a moisture compensation device.

17.3.2 Coarse Aggregate.

17.3.2.1 Grading. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall immediately be resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the

Chief Engineer. When two consecutive moving averages of 5 tests are outside of specification limits, that fact shall be reported to the Chief Engineer and immediate steps shall be taken to correct the grading.

17.3.2.2 Moisture Content. Whenever the moisture content of the smallest size of coarse aggregate changes by 0.5 percent or more, the scale settings for the aggregate batcher and water batcher shall be adjusted directly or by means of a moisture compensation device.

17.3.3 Deleterious Substances. When the results for a deleterious substance is outside the specification limit, the aggregate shall be immediately resampled and retested for the deleterious substance that failed. If the second sample fails, that fact shall be reported to the Chief Engineer. When material finer than No. 200 sieve for coarse aggregate exceeds specification limit, immediate steps, such as washing or other corrective actions, shall be initiated.

17.3.4 Scales. Whenever either the weighing accuracy or batching accuracy is found not to comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

17.3.5 Concrete.

17.3.5.1 Air Content. Whenever points on the control chart approach the upper or lower control limits an adjustment should be made in the amount of air-entraining admixture batched. If a single test result is outside the specification limit such adjustment is mandatory. As soon as practical after each adjustment another test shall be made to verify the correctness of the adjustment. Whenever a point falls above the upper control limit for range, the dispenser shall be calibrated to insure that it is operating correctly and with good reproducibility. Whenever two consecutive points either for average or range are outside the control limits, the Contracting Officer shall be notified. Whenever the air content departs from the specified range, the concrete shall not be delivered to the forms.

17.3.5.2 Slump. Whenever points on the control chart approach the upper or lower control limits an adjustment should be made in the batch weights of water and fine aggregate. When a single slump is outside the control limits such adjustment is mandatory. As soon as practical after each adjustment another test shall be made to verify the correctness of the adjustment. Whenever the slump departs more than $+1\frac{1}{2}$ inches stipulated in 3D-7.4, the concrete shall not be delivered to the forms. Whenever two consecutive slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range above the upper control limit, the slump shall be considered to be out of control and the additional testing for aggregate moisture content required in 3D-17.2.1.2 shall be undertaken.

17.3.6 Placing. The placing foreman shall not permit placing to begin until he has verified that an adequate number of acceptable vibrators in working order and with competent operators are available. Placing shall not be continued if any pile is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

17.3.7 Curing.

17.3.7.1 Moist Curing. When a daily inspection report lists an area of inadequate curing, the required curing period for that area shall be extended by one day.

17.3.8 Protection. Whenever any concrete temperature during the period of protection or protection removal fails to comply with the specifications, that fact shall be reported to the Chief Engineer and immediate steps should be taken to correct the situation.

17.3.9 Mixer Uniformity. When a mixer fails to meet mixer uniformity requirements, either the mixing time shall be increased or adjustments shall be made to the mixer until compliance is achieved.

17.4 Reports. All results of tests conducted at the project site shall be reported weekly and shall be delivered to a designated representative of the Chief Engineer within 3 days after the end of each weekly reporting period. Each weekly report shall include the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the obligation to report certain failures and the action taken shall be confirmed in writing in the routine reports. The Chief Engineer has the right to examine all Contractor quality control records. Format of the report shall be as prescribed in SC-4.

18. PAYMENT. No measurement for concrete will be made. Payment for concrete will be made at the contract lump sum price for "Reinforced Concrete Floodwalls" consisting of base slabs, stabilization slabs, columns, walls, waterstops, reinforcing steel, formwork, expansion joint filler, waterproof and bush-hammer finishes and other components incidental thereto which price shall include the cost of all labor, materials and the use of all equipment and tools required to complete the concrete work.

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SECTION 5A - MISCELLANEOUS METALWORK

1. SCOPE. The work covered by this section consists of furnishing all plant, labor, materials and equipment, and furnishing and installing the miscellaneous metalwork as shown on the drawings and specified herein and shall include, but is not limited to, the following items:

1.1 Reserved.

1.2 Corrosion Resistant Steel (C.R.S.).

1.2.1 Gate seal plates (except welded anchors).

1.2.2 Bolts, anchor bolts, threaded studs, washers, nuts, seal retaining bars, and seal deflecting bars.

1.2.3 Latching devices including handles, double end stud, eyebolts, and turnbuckle, anchor rods, nuts, and cap screws and seal retaining bars.

1.2.4 Settlement reference bolts.

1.2.5 Identification tag for reference bolts.

1.3 Forged and Machined Steel.

1.3.1 Welded anchors for gate seal plates, including anchor bolts, leveling nuts, and steel beams.

1.4 Hinges and Bearings. Hinges for swing gate including set screws, bolts, nuts, washers, shims, grease seals and fittings, mech. tubing, bronze bushings, upper hinge shaft, thrust washer, struts, bearing plate and bearing pedestal.

1.5 Fabricated Steel.

1.5.1 Galvanized corner protection angles with welded stud anchors..

1.5.2 Slip joint, I-wall to T-wall.

1.5.3 Bolt brackets.

1.5.4 Galvanized Removable Guard Post and Accessories.

1.6 Manufactured Products.

1.6.1 Flexible bonding jumpers for bonding of piling as specified in Section 16A.

1.6.2 Adjustable shackle padlocks and screw jacks.

2. QUALITY CONTROL.

2.1 General. The Contractor shall establish and maintain quality control for proper fabrication and installation of all work covered in this section to assure compliance with contract specifications and maintain records of his quality control for all construction operations including but not limited to the following:

- (1) Fabrication.
- (2) Protective coating.
- (3) Placement and protection.
- (4) Material compliance with plans and specifications.

2.2 Reporting. The original and two copies of these records and tests, as well as the records of corrective action taken, shall be furnished to the Board daily.

3. SHOP DRAWINGS. The Contractor shall prepare and submit for approval, complete shop drawings and descriptive literature showing details of all auxiliary items required as indicated herein or on the contract drawings. Shop drawings shall indicate computed weights of structural steel and approval of shop drawings will constitute acceptance of the computed weights shown on these drawings.

PART 2 - PRODUCTS

4. FABRICATED ITEMS.

4.1 General. Fabrication and placement of all fabricated items shall be as indicated on the drawings and shall conform to the applicable provisions of Section 5B.

4.2 Materials.

4.2.1 Stainless Steel Bolts and Nuts.

4.2.1.1 Stainless Steel Bolts. Stainless steel bolts shall conform to ASTM F 593-78, Group 2, Condition CW, 316 Alloy. Stainless steel bolts shall conform to the applicable provisions of 5B-12.

4.2.1.2 Stainless Steel Nuts. ASTM 594-78.

4.2.2 Corrosion Resistant Steel. Corrosion resistant steel shall conform to Federal Specification QQ-S-766C and Am. 5, Class 304. High strength corrosion resistant steel shall conform to ASTM A 276-83, Type 431.

4.2.3 Hinges.

4.2.3.1 Mechanical Tubing.

4.2.3.1.1 The mechanical tubing for the swing gate hinges shall consist of cold drawn seamless material conforming to the applicable provisions of ASTM specification A 513-81, Type 6.

4.2.3.2 Bearing Pedestal. The bearing pedestal for the swing gate shall consist of a stainless steel shaft (ASTM A-276, Type 431) with a stainless steel bottom plate (ASTM A-276, Type 304).

4.2.3.3 Lubrication fittings for bearings for the swing gate shall be pressure type with thread or surface check and 1/8-inch NPT threads, Alemite, or equal. Grease seals shall be Garlock Std., Klosure No. 2176 and 2753 or equal.

4.2.3.4 Bushings and Thrust Washers. Bushings and thrust washers for the swing gate shall conform to the applicable provisions of ASTM B 22, Copper Alloy No. 937, "Bronzed Castings for Bridges and Turntables". The upper hinge shaft shall be high strength CRS, meeting ASTM A 276, Type 431 specifications.

4.2.4 Seal Plates. Seal plates shall be solid corrosion-resistant steel ASTM A 263 of the sizes and dimensions indicated on the drawings.

4.2.4.1 Seal Plate Splice. Seal plates may be spliced at the Contractor's convenience and at no cost to the Board. The Contractor shall not commence work on any seal plate splice until the procedure has been approved by the Chief Engineer.

PART 3 - EXECUTION

5. WORKMANSHIP. All metalwork fabrication and machine work shall comply with the applicable provisions of Section 5B. All parts shall be properly fabricated, assembled and installed to conform to the shapes, sizes and dimensions indicated on the contract drawings and approved shop drawings.

5.1 Settlement Reference Bolts. Upon installation of the settlement reference bolts the Contractor shall determine elevations of each bolt and submit his results to the Chief Engineer. The Chief Engineer will then submit the results Engineering Division of the New Orleans District of the Corps of Engineers.

6. MEASUREMENT AND PAYMENT.

6.1 Unless otherwise specified herein, any materials or operations used in conjunction with installation or as part of metalwork which is not included in the cost of other items of work listed in the bidding schedule shall not be measured for payment. Payment for miscellaneous metalwork will be made at the contract lump sum price for "Structural Steel Gates, Miscellaneous Metals, and Specialty Items" which price and payment shall constitute full compensation for furnishing and installing all miscellaneous metalwork indicated on the drawings and/or herein specified which is not specified to be paid for under other items of work listed on the bidding schedule.

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SECTION 5B - METALWORK FABRICATION, MACHINE WORK
AND MISCELLANEOUS PROVISIONS

PART 1 - GENERAL

1. SCOPE. This section specifies the general workmanship standards applicable to the fabrication, assembly and testing of various items of metalwork and machine work to insure conformance with the specifications and miscellaneous requirements incident to the work. The requirements are in addition to those contained in the section pertaining to the specific item of work or indicated on the drawings.

2. APPLICABLE PUBLICATIONS. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto or as required.

2.1 American National Standards Institute (ANSI)
Specifications.

B4.1-67 (Rev. 1979)	Preferred Limits and Fits for Cylindrical Parts
B46.1-78	Surface Texture (Surface Roughness, Waviness and Lay)

2.2 American Society for Testing and Materials (ASTM)
Standards.

A 123-78	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
A 325-83c	High-Strength Bolts for Structural Steel Joints
A 490-83a	Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints
A 380-78	Cleaning and Descaling Stainless Steel Parts, Equipment and Systems
A 514-82a	High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
F 593-78	Stainless Steel Bolts, Hex Cap, Screws and Studs
F 594-78	Stainless Steel Nuts

2.3 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code.

Section IX Welding and Brazing Qualifications

2.4 American Welding Society, Inc. (AWS) Code.

D 1.1-83 Structural Welding Code

2.5 Federal Specifications (Fed. Spec.).

FF-S-85C(1) Screw, Cap, Slotted and Hexagonhead

FF-B-575C Bolts, Hexagon and Square

TT-P-645A Primer, Paint, Zinc-Chromate, Alkyd Type

TT-V-119D (2) Varnish, Spar, Phenolic Resin

FF-W-92 B Washers, Metal, Flat (Plain)

FF-N-836D(1) Nuts, Square, Hexagon, Cap Slotted, Castle, Knurled, Welding and Single Ball Seat

2.6 Military Specifications (Mil. Spec.).

MIL-C-18480 B Coating Compound, Bituminous, Solvent, Coal Tar Base

DOD-P-21035 A Paint, High Zinc Dust Content, Galvanizing Repair

2.7 Military Standard (MIL-STD).

MIL-STD-00248B Welding and Brazing Procedure and (SHIPS) Performance Qualification

2.8 Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation (RCRBSJ) Specification.

Specification for Structural Joints Using ASTM A 325 or A 490 Bolts

3. QUALITY CONTROL.

3.1 Tests of Materials. The Contractor shall, at his expense, perform analyses and tests to demonstrate that all materials are in conformity with the specifications. Should the Contractor desire to use stock materials not manufactured specifically for the work covered by these specifications, he shall submit evidence, satisfactory to the Chief Engineer.

that such material conforms to the requirements of the specifications. Detailed tests of these materials will then not be required, if so approved by the Chief Engineer Tests, except where modified, shall be made as indicated in the respective detailed specifications or on the drawings and, unless otherwise authorized, in the presence of the Chief Engineer. The Contractor shall furnish the Chief Engineer certified reports in triplicate of all required analyses and tests. The Contractor shall furnish the Chief Engineer upon request, specimens and samples for independent analyses and tests. These specimens and samples shall be properly labeled and prepared for shipment.

3.2 Special Test Requirements.

3.2.1 Nondestructive Testing. When doubt exists as to the soundness of any material part, such part may be subjected to any form of nondestructive testing as determined by the Chief Engineer. This may include ultrasonic, magnaflux, dye penetrant, x-ray, gamma ray or any other test that will thoroughly investigate the part in question. The cost of such investigation will be borne by the Board. Any defects will be cause for rejection and the rejected part shall be replaced and retested at the Contractor's expense.

3.2.2 Tests of Machinery and Structural Units. Each complete machinery and structural unit, as required by other sections of these specifications, shall be erected and tested in the shop in the presence of the Chief Engineer unless otherwise directed by the Chief Engineer. Waiving of tests, however, will not relieve the Contractor of responsibility for any fault in operation, workmanship, or material that may develop before the completion of his contract or guarantee. After being assembled in place at the site, each complete machine or structural unit shall be operated through a sufficient number of complete cycles to demonstrate to the satisfaction of the Contracting Officer that it meets specification operational requirements in all respects. The details for tests on the various machinery and structural units shall conform to the requirements of the particular sections of these specifications.

3.3 Workmanship.

3.3.1 General. Workmanship shall be of the highest grade in accordance with the best modern practices to conform to the specifications for the item of work being furnished.

3.3.2 Quality Control. The Contractor shall establish and maintain a quality control standard to assure compliance with the contract requirements and shall maintain records of his quality control of all operations covered by these specifications.

4. SUBMITTALS. Contractor submittals shall be in accordance with the specifications and as herein specified.

4.1 Shop Drawings. Shop drawings shall be submitted for approval in accordance with the Contract Clauses. Drawings shall include catalog cuts, templates, fabrication and assembly details, and type, grade, and class of materials, as appropriate. Elements of fabricated items inadvertently omitted on contract drawings shall be detailed by the fabricator and indicated on the shop drawings.

4.2 Lists of Materials. The Contractor shall furnish the Chief Engineer 3 copies of all purchase and mill orders, shop orders for materials and work orders, including all new orders placed by Contractors and old orders extended by each supplier. The Contractor, at the time of submittal of shop drawings, shall furnish a list designating the material to be used for each item. Where mill tests are required, the purchase orders shall contain the test site address and the name of the testing agency. The Contractor shall also furnish a shipping bill or memorandum of each shipment of finished pieces or members to the project site, giving the designation mark and weight of each piece, the number of pieces, the total weight, and if shipped by rail in carload lots, the car initial and number. Copies of certified shipping bills, in duplicate, shall be mailed promptly to Chief Engineer, Orleans Levee Board.

4.3 Schedule of Welding Procedure. A complete schedule of welding procedure as described in paragraph 5B-10.1.5.1 shall be submitted to the Chief Engineer and approved before fabrication is commenced.

4.4 Certificates. Certificates for material tests, examinations, and welding procedure and operator qualifications shall be submitted for approval as specified.

PART 2 - PRODUCTS

5. GENERAL. All nuts shall be equipped with washers where indicated on the drawings. Beveled washers shall be used where bearing faces have a slope of more than 1:20 with respect to a plane normal to the bolt axis.

6. BOLTS, NUTS AND WASHERS. The finished shank of each bolt shall be long enough to provide full bearing and washers shall be used to provide full grip when the nut is tightened.

6.1 Bolts, including anchor bolts, shall conform to the applicable provisions of Federal Specification FF-B-575, Type II, standard thread, size as noted, and carbon steel or ASTM A 325 unless indicated otherwise on the drawings or in other section of the specifications.

6.2 Nuts, shall conform to the applicable provisions of Federal Specification FF-N-836, Type II, Style 4, standard thread, size as noted, and carbon steel or ASTM A 325 unless indicated otherwise on the drawings or in another section of the specifications.

6.3 Cap Screws, shall conform to the applicable provisions of Federal Specification FF-S-85, Type II, Style 10p, standard thread unless indicated otherwise on the drawings or in another section of the specifications.

6.4 Washers, shall conform to the applicable provisions of Federal Specification FF-W-92, Type A, Grade I, Class A for steel bolts and Class B for CRS bolts, unless indicated otherwise or in another section of specifications.

PART 3 - EXECUTION

7. STRUCTURAL FABRICATION.

7.1 General. Material must be straight before being laid off or worked. If straightening is necessary, it shall be done by methods that will not impair the metal. Sharp kinks or bends shall be cause for rejection of the material. Material with welds will not be accepted, except where welding is definitely specified, indicated on the drawings, or otherwise approved. Bends, except for minor details, shall be made by approved dies, press brakes, or bending rolls. Where heating is required, precautions shall be taken to avoid overheating the metal and it shall be allowed to cool in such a manner as not to destroy the original properties of the metal. Flame cutting of material other than structural steel shall be subject to approval and, where proposed, shall be indicated on shop drawings submitted to the Chief Engineer. Shearing shall be accurately done and all portions of the work shall be neatly finished. Corners shall be square and true unless otherwise shown on the drawings. Re-entrant cuts shall be filleted to a minimum radius of 3/4-inch unless otherwise approved. Finished members shall be free from twists, bends and open joints. All bolts, nuts and screws shall be tight.

7.2 Dimensional Tolerances for Structural Work. Dimensions shall be measured by means of an approved calibrated steel tape of approximately the same temperature as the material being measured at the time of measurement. The overall dimensions of an assembled structural unit shall be within the tolerances indicated on the drawings or as specified in the section pertaining to the specific item of work. Except as required to meet the requirements above, an allowable variation of 1/32-inch is permissible in the overall length of individual component members with both ends milled; individual component members without milled ends shall not deviate from the dimensions shown on the drawings by more than 1/16-inch for members 30 feet or less in length and by more than 1/8-inch for members over 30 feet in length.

7.3 Structural Steel Fabrication. Structural steel may be cut by mechanically guided or hand guided torches provided an accurate profile with a smooth surface which is free from cracks and notches is obtained. Surfaces and edges to be welded shall be prepared in accordance with Article 3.2 of AWS D1.1. Where structural steel is not to be welded, chipping or grinding will not be required except as necessary to remove slag and sharp edges of mechanically guided cuts or hand guided cuts not exposed to view. Hand guided cuts which are to be exposed or visible shall be chipped, ground or machined to sound metal.

8. CASTINGS.

8.1 General. Each casting shall have the mark number cast or stamped upon it. In addition, each casting weighing more than 500 pounds shall have the heat numbers cast or stamped upon it. Deviations from the dimensions and the thicknesses of casting as shown on the drawings will not be permitted to exceed such amounts as will impair by more than 10 percent the strength of the castings as computed from the dimensions shown. Dimensions of castings shown on approved shop drawings shall be furnished dimensions. Warped or otherwise distorted castings or castings that are oversize to an extent that will interfere with proper fit with other parts of the machinery or structure will be rejected. The structure of the metal in the castings shall be homogeneous and free from excessive nonmetallic inclusions. Excessive segregation of impurities or alloys at critical points in a casting will be cause for its rejection. Repairs to castings shall not be made prior to approval by the Chief Engineer. Minor surface imperfections not affecting the strength of casting may be welded in the "green" if approved by the inspector. Surface imperfections shall be considered minor when 20 percent of the actual wall thickness, but in no case greater than 1-inch. Defects other than minor surface imperfections may be welded only when specifically authorized in accordance with the following requirements:

(1) The defects have been entirely removed and are judged not to affect the strength, use, or machinability of the castings when properly welded and stress relieved.

(2) The proposed welding procedure, stress relieving and method of examination of the repair work have been submitted and approved.

9. PATTERNS. In the construction of patterns, care shall be taken to avoid sharp corners or abrupt changes in cross section, and ample fillets shall be used. The Contractor shall add such draft and increases in pattern thicknesses as will conform to his standard foundry practice and as may be necessary to insure that all metal thicknesses of the finished castings will be in accordance with the dimensions shown on the drawings, within the tolerances specified in 5B-8.1. All patterns will remain the property of the Contractor.

10. WELDING.

10.1 Structural Steel.

10.1.1 General. Unless otherwise authorized or specified, welding of structural steel shall be by an electric arc welding process, using a method which excludes the atmosphere from the molten metal. Welding, unless specified otherwise, shall conform to the applicable provisions of Sections 1 thru 7 and Sections 9 and 10 of AWS D1.1.

10.1.2 Welding Equipment. All items of welding equipment shall conform to the requirements of AWS D1.1.

10.1.3 Filler Metal. The electrode, electrode-flux combination and grade of weld metal shall conform to the appropriate AWS specification for the base metal and welding process being used. Only low hydrogen electrodes shall be used for manual shielded metal-arc welding regardless of the thickness of the steel. The AWS designation of the electrodes to be used shall be included in the schedule of welding procedure to be furnished by the Contractor. To maintain low moisture of low hydrogen electrodes, a controlled temperature storage oven shall be used at the job site as prescribed by Article 4.5 of AWS D1.1.

10.1.4 Qualification of Welders and Welding Operators. Welding operators, welders, and tack welders shall be qualified and, as necessary, requalified for the particular type of work to be done. Qualification shall be in accordance with Section 5 of AWS D1.1, MIL-STD-00248 or Section IX of the ASME Boiler and Pressure Vessel Code. The Contractor shall certify by name to the Chief Engineer the welders and welding operators so qualified including the date of qualification, code and procedures under which qualified. Prior qualification may be accepted provided the welder has performed satisfactory work under the code for which qualified within the preceding three months. The Contractor shall require the welder or welding operator to repeat the qualifying tests when, in the opinion of the Chief Engineer his work indicates a reasonable doubt as to his proficiency. In such cases, he shall be recertified, as above, if he successfully passes the retest; otherwise, he shall be disqualified until he has successfully passed a retest. All expenses in connection with qualification and re-qualification shall be borne by the Contractor.

10.1.5 Workmanship Requirements.

10.1.5.1 Welding Procedure. The Contractor shall prepare for submission to the Contracting Officer a complete schedule of welding procedure which shall consist of detailed procedure specifications for each structure to be welded and tables or diagrams showing the procedure to be used for each required joint. The schedule shall conform to the provisions of Sections 2, 3, 4 and 9 and applicable provisions of Section 10 of AWS

D1.1, include filler metal requirements, preheat and interpass temperature requirements and any stress relief heat treatment, and show the types and locations of welds designated on the drawings and/or in the specifications to receive nondestructive examination. The procedures shall be such as to minimize residual stresses and distortion of the completed weldment. Procedures shall be qualified by tests as required and prescribed in Section 5 of AWS D1.1 except for prequalified procedures as described in Article 5.1 of AWS D1.1. Properly documented evidence of compliance with all requirements of these specifications for previous qualification tests will establish the joint welding procedure as prequalified. Each procedure shall be clearly identified as being either prequalified or qualified by tests. The test welding and specimen testing must be witnessed and the test report document signed by a representative of the Chief Engineer. The Contractor will be directed or authorized to make any changes in previously approved welding procedures that are deemed necessary or desirable by the Chief Engineer. Approval of any procedure, however, will not relieve the Contractor of the responsibility for producing a finished structure meeting all requirements of these specifications.

10.1.5.2 Stress Relief Heat Treatment. Where stress relief heat treatment is specified or required on the drawings, it shall be in accordance with the requirements of Article 4.4 of AWS D1.1, unless otherwise authorized or directed by the Chief Engineer.

10.1.5.3 Preheat and Interpass Temperature. Preheating shall be performed as required by Articles 4.2 and 4.3 of AWS D1.1 or as otherwise specified, except that the temperature of the base metal shall be at least 70°F. The weldments to be preheated shall be slowly and uniformly heated by approved means to the prescribed temperature, held at that temperature until the welding is completed and then permitted to cool slowly in still air.

10.1.5.4 Temporary Welds. Temporary welds required for fabrication and erection shall be made under the controlled conditions prescribed herein for permanent work. All temporary welds shall be made using low-hydrogen welding electrodes by welds qualified for permanent work as specified elsewhere in these specifications. Preheat furnished for temporary welds shall be as required by AWS D1.1 for permanent welds except that the minimum temperature shall be 120°F in any case. In making temporary welds, arcs shall not be struck in other than weld locations. Each temporary weld shall be removed after serving its purpose and ground flush with adjacent surfaces.

10.1.5.5 Tack Welds. Tack welds that are to be incorporated into the permanent work shall be subject to the same quality requirements as the permanent welds. Preheating shall be

performed as specified for temporary welds above. Such tack welds shall be cleaned and fused thoroughly with the permanent welds. Multiple-pass tack welds shall have cascaded ends. Defective tack welds shall be removed before permanent welding.

10.1.6 Inspection.

10.1.6.1. General. Welding shall be subject to inspection by Board Inspectors to determine conformance with the requirements of AWS D1.1, the approved welding procedures, and provisions stated elsewhere in these specifications. The Chief Engineer will require nondestructive inspection of designated welds and may require supplemental examination of any joint or coupons to be cut from any location in any joint. The Contractor shall maintain an adequate inspection system and perform the necessary inspections in accordance with the Inspection of Construction paragraph of the Contract Clauses of this contract.

10.1.6.2 Visual Examination. Prior to any welding, the Contractor shall visually inspect the preparation of material for welding to assure compliance with Section 3 of AWS D1.1. All completed welds shall be cleaned and examined carefully by the Contractor for insufficient throat or leg sizes, cracks, undercutting, overlap, excessive convexity or reinforcement, and other surface defects to insure compliance with the requirements of Section 3 and Section 9, Part D of AWS D1.1. Defects shall be corrected as provided in 5B-10.1.7 below.

10.1.6.3 Test Coupons. The Board reserves the right to require the Contractor to remove coupons from completed work when doubt as to soundness cannot be resolved by nondestructive examination. Should any two coupons cut from the work of any welder show strengths, under test, less than that specified for the base metal, it will be considered evidence of negligence or incompetence, and such welder shall be removed from the work. When coupons are removed from any part of a structure, the members cut shall be repaired in a neat workmanlike manner with joints of proper type to develop the full strength of the members, with peening as approved or directed to relieve residual stress. The expense for removal and testing of the coupons, repair of the cut members and the performance of nondestructive examination of the repairs shall be assigned to the Board or the Contractor in accordance with the Inspection of Construction paragraph of the Contract Clauses of this contract.

10.1.6.4 Supplemental Examination. The Board reserves the right to perform supplemental nondestruction examinations as deemed necessary when the soundness of any weld is in doubt and to detect cracking or similar defects that might occur during shipment or erection and before final acceptance by the Board. The cost of such inspection will be borne by the Board. The repairs and the reexamination of repairs will be performed by the Contractor at no additional cost to the Board.

10.1.7 Repairs. Defective weld metal shall be removed by air carbon-arc or oxygen gouging to sound metal. Oxygen gouging shall not be used on ASTM A 514 steel. The surfaces shall be thoroughly cleaned before welding. The resulting cavities shall be rewelded in compliance with Article 6.6 of AWS D1.1. When deemed necessary by the Chief Engineer the Contractor shall submit a welding repair plan for approval before repairs are made. Welds that have been repaired shall be retested by the same methods used in the original inspection. All costs of repairs and testing shall be borne by the Contractor, except for repair of members cut to remove test coupons which were found to contain acceptable welds.

10.1.8 Oxygen Cutting. In all oxygen cutting, flame shall be so adjusted and manipulated as to avoid cutting beyond the prescribed lines. Cut surfaces and edges shall be left free of slag.

11. STUD WELDING.

11.1 General. Stud welding, unless otherwise specified, shall conform to the applicable provisions of Section 7, Part F of AWS D1.1, 1983 Edition.

11.2 Stud Materials. The type, size and length of studs shall be as indicated on the drawings. The Contractor shall furnish for approval the manufacturer's certified test reports and certification that the studs are in accordance with the applicable provisions of Articles 7.2 and 7.3 of AWS D1.1.

11.3 Stud Base Qualification Requirements. As a condition of approval, the Contractor shall furnish, from the manufacturer of the stud, a certified report giving data, procedures and results of tests performed in accordance with the provisions of Article 7.6 of AWS D1.1. The test specimens shall be prepared using suitable specimen plates of the same base metal to which the studs are to be welded.

11.4 Workmanship. The studs shall be welded in accordance with the provisions of Article 7.4 of AWS D1.1. Studs on which a full 360 degree weld fillet is not obtained may, at the option of the Contractor, be repaired by adding a 3/16-inch fillet, using shielded metal arc process with low-hydrogen welding electrodes. If the reduction of the length of studs becomes less than normal as they are welded, welding shall be stopped immediately and not resumed until the cause has been corrected.

11.5 Inspection. The welding of stud connectors will be subject to visual inspection by Board Inspector. Each stud connector that does not show a full 360 degree weld fillet, that has been repaired by welding, or the reduction in length due to welding is less than normal shall be tested in accordance with the requirements for testing of one in every 100 stated in 11.6 below.

11.6 Testing. Prior to starting welding operation and at the beginning of each day's operation, two stud connectors shall be welded in the same general position (flat, vertical, overhead, sloping) to a separate piece of material of similar thickness and composition as the member to which the studs are to be welded. After being allowed to cool, these studs shall be tested by bending to an angle of 30 degree by striking the stud with a hammer. If failure occurs in the weld zone of either stud, the procedure shall be corrected and two successive studs successfully welded and tested before any studs are welded to the member. The foregoing testing shall be performed after any change in the welding procedure. If failure occurs in the stud shank, an investigation shall be made to ascertain and correct the cause before further welds are made. In addition to the foregoing tests at least one stud in every 100 shall be struck with a hammer and bent to an angle of 15 degree or if threaded shall be torque tested with a calibrated torque wrench as indicated in Figure 7.6.6 of AWS D1.1. If the stud fails, two more of the existing studs shall be bent or torque tested. If either of these two studs fails, all of the studs represented by the tests shall be rejected. Studs under testing that crack either in the weld, the base metal, or the shank shall be rejected and replaced by the Contractor at no additional cost to the Board.

12. BOLTED CONNECTIONS.

12.1 Structural Steel Connections.

12.1.1 General. Bolts, nuts, and washers shall be of the type specified or indicated on the drawings. All nuts shall be equipped with washers except for high strength bolts. Beveled washers shall be used where bearing faces have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the use of high strength bolts is specified or indicated on the drawings, the materials, workmanship and installation shall conform to the applicable provisions of the RCRESJ Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.

12.1.2 Bolt Holes. All bolt holes shall be accurately located, smooth, perpendicular to the member and cylindrical.

12.1.2.1 Holes for regular bolts shall be drilled or subdrilled and reamed in the shop and not more than 1/16-inch larger than the diameter of the bolt.

12.1.2.2 Holes for high strength bolts shall have diameters of not more than 1/16-inch larger than the bolt diameter. If the thickness of the material is not greater than the diameter of the bolt, the holes may be punched. If the thickness of the material is greater than the diameter of the bolt, the holes will be either drilled full size or shall be subpunched or subdrilled at least 1/8-inch smaller than the diameter of the bolt and then

reamed to full size. Poor matching of holes will be cause for rejection. Drifting done during assembly shall not distort the metal or enlarge the holes. For slight mismatching, reaming to a larger diameter for the next standard size bolt will be allowed.

13. SHOP ASSEMBLY. Unless otherwise specified, each machinery an structural unit furnished shall be assembled in the shop to determine the correctness of the fabrication and matching of the component parts. The tolerances shall not exceed those shown on the drawings and each unit assembled shall be closely checked to insure that all necessary clearances have been provided and that binding does not occur in any moving part. Assembly in the shop shall be in the same position as final installation (closed position) in the field unless otherwise specified. Assembly and disassembly work shall be performed in the presence of a Chief Engineer unless waived in writing by the Chief Engineer and any errors or defects disclosed shall be immediately remedied by the Contractor, without cost to the Board. Before disassembly for shipment, each piece of a machine or structure shall be match-marked to facilitate erection in the field. The location of match-mark shall be indicated by circling with a ring of white paint after the shop coat of paint has been applied, or as otherwise directed.

14. MACHINE WORK.

14.1 General. Unless otherwise shown on the shop drawings, all tolerances, allowances, and gages for metal fits between plan, non-threaded, cylindrical parts shall conform to ANSI B4.1 for the class of fit as shown on otherwise required. Where fits are not shown they shall be suitable as determined by the Chief Engineer. Tolerances for machined-finished surfaces designated by non-decimal dimensions shall be within 1/64-inch. Sufficient machining stock shall be allowed on placing pads to insure true surfaces of solid material. Finished contact or bearing surfaces shall be true and exact to secure full contact. Journal surfaces shall be polished and all surfaces shall be finished with sufficient smoothness and accuracy to insure proper operation when assembled. Parts entering any machine shall be carefully and accurately machined and all like parts shall be interchangeable, provided that, where parts are assembled together for drilling and/or reaming of holes or for machining, the parts will not be required to be interchangeable with like parts insofar as the assemble operation is concerned after this operation is completed. All drilled holes for bolts shall be accurately located.

14.2 Finished Surface.

14.2.1 Where surface finishes are indicated on the drawings or specified herein the symbols used or finishes specified shall be in accordance with ANSI B46.1. Values of roughness height specified are arithmetical average of deviations expressed in

micro inches. Roughness specified is the maximum value and any lesser degree will be satisfactory unless otherwise called for on the drawings. Compliance with specified surface shall be determined by sense of feel and by visual inspection of the work compared to Roughness Comparison Specimens, in accordance with the provisions of ANSI B46.1. Values of roughness width and waviness height are not specified, but shall be consistent with the general type of finish specified by roughness height. Flaws such as scratches, ridges, holes, peaks, cracks or checks which will make the part unsuitable for the intended use will be cause for rejection.

14.2.2 Where the finish is not indicated or specified, the type of finish shall be that which is more suitable for the surface to which is applied and shall be consistent with the class of fit required. Surfaces to be machine finished shall be indicated on the shop drawings by symbols which conform to ANSI B46.1.

14.3 Unfinished Surfaces. So far as practicable, all work shall be laid out to secure proper matching of adjoining unfinished surfaces. Where there is a large discrepancy between adjoining unfinished surfaces, they shall be chipped and ground smooth, or machined, to secure proper alignment. Unfinished surfaces shall be true to the lines and dimensions shown on the drawings and shall be chipped or ground free of all projections and rough spots. Depressions or holes not affecting the strength or usefulness of the parts shall be filled in a manner approved by Chief Engineer.

14.4 Pin Holes shall be bored true to gages, smooth and straight, and at right angles to the axis of the member. The boring shall be done after the member is securely fastened in position.

14.5 Shafting. Unless otherwise specified or authorized, all shafting shall be turned or ground hot-rolled or cold-rolled steel as required. Fillets shall be provided where changes in section occur. Cold-finished shafting may be used where keyseating is the only machine work required.

14.6 Bearings. Unless otherwise specified or shown on the drawings, bearing may be lined with babbitt or bronze. Where the bearing pressure is in excess of 200 pound per square inch, bearings shall be lined with bronze. Unless otherwise required or authorized, pressures on lined bearings shall not exceed 1000 pound per square inch of projected area. Anti-friction bearings of approved types and of sizes not less than those recommended by the bearing manufacturer for the duty intended may be permitted subject to approval. All bearings shall be properly aligned and provided with a suitable means of lubrication. Anti-friction bearings shall be so installed as to provide for retention of the lubricant and to exclude dirt and grit.

15. MISCELLANEOUS PROVISIONS.

15.1 Metallic Coatings.

15.1.1 Zinc Coatings. Zinc coatings shall be applied in a manner and of a thickness and quality conforming to ASTM A 123. In all cases where zinc coating is destroyed by cutting, welding, or other causes, the affected areas shall be regalvanized by the following methods. Coatings 2 ounces or heavier shall be regalvanized with a suitable low-melting zinc base alloy similar to the recommendations of the American Hot-Dip Galvanizers Association to the thickness and quality specified for the original zinc coating. Coatings less than 2 ounces shall be regalvanized by a repair compound conforming to DOD 21035.

15.2 Cleaning of Corrosion-Resisting Steel. After fabrication, oil, paint and other foreign substances shall be removed from corrosion-resisting steel surfaces. Cleaning shall be done by vapor degreasing or by the use of cleaners of the alkaline, emulsion or solvent type. After the surfaces have been cleaned, they shall be given a final rinsing with clean water followed by a 24-hour period during which the surfaces are intermittently wet with clean water and then allowed to dry for the purpose of inspecting the clean surface. The surfaces shall be visually inspected for evidence of paint, oil, grease, welding slag, heat treatment scale, iron rust or other forms of contamination. If evidence of foreign substance exists, the surface shall be cleaned in accordance with the applicable provisions of Section 6 of ASTM A 380. The proposed method of treatment shall be furnished for approval. After treatment the surfaces shall be visually reinspected. Brushes used to remove foreign substances shall utilize only stainless steel or nonmetallic bristles. Any contamination occurring subsequent to the initial cleaning shall be removed by one or more of the methods indicated above.

15.3 Protection of Finished Work.

15.3.1 Machined Surfaces shall be thoroughly cleaned of foreign matter. All finished surfaces shall be protected by suitable means. Unassembled pins and bolts shall be oiled and wrapped with moisture resistant paper or protected by other approved means. Finished surfaces of ferrous metals to be in bolted contact shall be washed with a rust inhibitor and coated with a suitable rust resisting compound for temporary protection during fabrication, shipping, and storage periods. Finished surfaces of metals which will be exposed after installation shall be painted as specified in Section 9A EXTERIOR PAINTING, except painting of corrosion resisting steel or nonferrous metals will not be required.

15.3.2 Lubrication. The arrangement and details for lubrications shall be as shown on the drawings. Before erection or assembly, all bearing surfaces shall be thoroughly cleaned and lubricated with an approved lubricant. After assembly, all lubricating systems shall be filled with the lubricant specified and, as required, additional lubricant shall be applied at regular intervals to maintain the equipment in satisfactory condition until acceptance of the work by the Government.

15.3.2.1 Threads on screw jacks and gate latches, shall be lubricated with the lubricant specified above and maintained in satisfactory condition until acceptance of the work by the Board.

16. INSTALLATION.

16.1 General. All parts to be installed shall be thoroughly cleaned. Packaging compounds, rust, dirt, grit and other foreign matter shall be removed. Holes and grooves for lubrication shall be cleaned. Enclosed chambers or passages shall be examined to make sure that they are free from damaging materials. Where units or items are shipped as assemblies they will be inspected by a representative of the Chief Engineer prior to installation. Disassembly, cleaning and lubrication will not be required except where there is indication that such work is necessary to place the assembly in a clean and properly lubricated condition. Pipe wrenches, cold chisels, or other tools likely to cause damage to the surfaces of rods, nuts, or other parts shall not be used for the work of assembling and tightening parts. Bolts and screws shall be tightened firmly and uniformly, but care shall be taken not to overstress the threads. When a half nut is used for the purpose of locking a full nut, the half nut shall be placed first and followed by the full nut. Threads of all bolts, except high strength bolts, nuts and screws shall be lubricated by graphite and oil before assembly. Threads of corrosion-resisting steel bolts and nuts shall be coated with a suitable anti-galling compound. Driving and drifting bolts or keys will not be permitted.

16.2 Alignment and Setting. Each machinery or structural unit shall be accurately aligned by the use of steel shims or other approved methods so that no binding in any moving parts or distortion of any member occurs before it is finally fastened in place. The alignment of all parts with respect to each other shall be true within the respective tolerances required. The machine shall be set true to the elevations shown on the drawings.

16.3 Blocking and Wedging. All blocking and wedging used for the support, during installation, of parts to be grouted in shall be removed before final grouting, unless otherwise directed by the Chief Engineer. Blocking and wedges left in the foundation with the approval of the Chief Engineer shall be of steel or iron.

16.4 Foundations and Grouting. Concreting of sub-bases and frames and the final grouting under parts of machines shall be in accordance with good construction practices.

16.5 Expansion Joint Covers. Expansion joint covers shall be set in formwork before pouring concrete and protected from damage and soil.

16.6 Pipe Sleeves. Pipe sleeves shall be set in formwork before pouring concrete. Align and space as indicated on the drawings.

17. PAYMENT. No separate payment will be made for the material and work covered under this section and all costs in connection therewith shall be included in the applicable contract price for the item of which the work pertains.

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SECTION 5C- SWING GATE AND MITER SWING GATES

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all plant, shop drawings, equipment, labor and materials for furnishing and installing the swing gates and all auxiliary items required for closing, sealing, latching, operating and storing these gates as indicated on the drawings and specified herein.

2. QUALITY CONTROL.

2.1 General. The Contractor shall establish and maintain quality control for swing gate operations to assure compliance with contract specifications and maintain records of his quality control for all construction operations including, but not limited to the following:

(1) Insure timely submittal of shop drawings.

(2) Inspection on delivery of fabricated items for damage, defects and conformance with approved shop drawings.

(3) Installation in conformance with manufacturer's recommendations and/or contract requirements.

2.2 Reporting. The original and two copies of these records and tests, as well as the records of corrective action taken, shall be furnished to the Board daily.

3. SHOP DRAWINGS. The Contractor shall prepare and submit for approval of the Chief Engineer complete shop drawings and descriptive literature showing details of the swing gates required as indicated herein and on the contract drawings.

PART 2 - PRODUCTS

4. MATERIAL GRADES, TYPES AND CLASSES. Materials for the gates shall be as indicated on the drawings and as follows:

<u>PART</u>	<u>MATERIALS</u>
Girders, ribs, rods, skin plates, structural tubing, gussets, corner protection angles, stiffeners, angles, bars, plates and other structural steel not otherwise indicated or specified	Structural steel as specified in 5C-4.1.
Seal plate, seal retaining bars, and hinges for swing gates	Corrosion resisting steel as specified in 5C-4.2.

Auxiliary items

As indicated on drawings or specified in Sections 5A and 10A.

4.1 Structural Steel. Structural steel for the gates shall conform to the applicable provisions of ASTM A 36-81a, standard specifications for "Structural Steel", and shall conform to the shapes and sizes indicated on the drawings. High strength structural steel shall conform to the applicable provisions of ASTM A 572-82, Grade 50.

4.2 Corrosion Resisting Steel.

4.2.1 Seal Plate Retaining Bars. The seal plates and seal retaining bars for gates shall be corrosion-resisting steel of the sizes and dimensions indicated on the drawings and shall comply with the provisions of 5A-4.2.2.

4.2.2 Hinges for Swing Gates. The hinges for swing gates shall be corrosion resisting steel of the sizes and types indicated on the drawings and in accordance with Section 5A-4.2.3.

4.3 Gate Seals and Miter Blocks. Gate seals and miter blocks for the gates shall be made to the shapes, sizes and dimensions shown on the drawings and shall be made from rubber.

4.3.1 The rubber seals shall be molded only and the material shall be compounded of natural rubber or a copolymer of butadiene and styrene, or a blend of both and shall contain reinforcing carbon black, zinc oxide, accelerators, antioxidants, vulcanizing agents and plasticizers. Physical characteristics shall meet the following requirements:

<u>Physical Test</u>	<u>Test Value</u>	<u>Test Method Specification</u>
Tensile Strength	3000 psi (min)	Fed. Std. 601, Method No. 4111 or - ASTM D 412-83
Elongation at Break	450% (min)	Fed. Std. 601, Method No. 4121 or - ASTM D 412-83
300% Modulus	900 psi (min)	Fed. Std. 601, Method No. 4131 or - ASTM D 412-83
Durometer Hardness Shore type A	60 to 70	Fed. Std. 601, Method No. 3021 or - ASTM D 2240-81

Water Absorption	5% by weight (max)	Fed. Std. 601, Method No. 6631 or - ASTM D 471-79
Compression Set	30% (max)	Fed. Std. 601, Method No. 3311 or - ASTM D 395-82
Tensile Strength after Oxygen Bombing Agent	80% (min) of tensile strength	Fed. Std. 601, Method No. 7111 or - ASTM D 572-81

4.3.2 All joints in seals shall be spliced as specified for non-metallic waterstops in Section 3C-7.2.1.

4.4 Auxiliary Items. Auxiliary items shall be as indicated on the drawings and specified in Section 5A and 10A.

PART 3 - EXECUTION

5. WORKMANSHIP. All metalwork fabrication and machine work shall comply with the applicable provisions of Section 5B. All parts shall be properly fabricated, assembled and installed to conform to the shapes, sizes and dimensions indicated on the contract drawings and approved shop drawings.

6. TRIAL OPERATION AND TEST. After erection and before final acceptance, the gates shall be operated back and forth between the stored position and the latched closed (sealed) position a sufficient number of times to demonstrate to the satisfaction of the Chief Engineer that the gates have been properly installed and adjusted as required by the drawings and specifications. The workmanship and adjustments shall be such that: when unlatched, the gates will move freely; when latched in the stored position, the gates will be securely fastened against movement in any direction and, when latched in the closed position, the gates will be securely fastened against movement in any direction. Any defects disclosed during testing shall be promptly corrected without additional cost to the Board and the tests repeated until the gates have satisfactorily passed the tests. No separate payment will be made for testing and adjusting the gates.

7. MEASUREMENT AND PAYMENT.

7.1 Structural Steel.

7.1.1 Measurement. No measurement will be made for structural steel.

7.1.2 Payment. Payment for structural steel for the gates will be included in the contract lump sum price for "Structural Steel Gates, Miscellaneous Metals and Specialty Items" which payment shall constitute full compensation for furnishing,

fabricating, shop and field painting, assembling, and placing the structural steel shown on the drawings or required by these specifications, and testing the operation of the gates. Structural steel for the gates includes girders, ribs, skin plates, stiffeners, gussets, bars, shims, angles, plates, seal plate, seal retaining bar, gate seals and miter blocks, and other structural steel not otherwise indicated or specified.

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SECTION 9A - EXTERIOR PAINTING

PART 1 - GENERAL

1. **SCOPE.** The work covered by this section of the specifications consists of furnishing all plant, labor, equipment, appliances, and materials and in performing all operations in connection with preparation of surfaces and application of paint and other specified materials. This work shall be accomplished in complete and strict accordance with the specifications and the applicable drawings and shall be subject to the terms and conditions of the contract.

2. QUALITY CONTROL.

2.1 **General.** The Contractor shall establish and maintain quality control for painting operations to assure compliance with contract specifications and maintain records of his quality control for all construction operations including but not limited to the following:

- (1) Cleaning and preparation of surfaces.
- (2) Paint and formulation.
- (3) Number of coats and date of application.
- (4) Protection of paint surfaces.

2.2 **Reporting.** The original and two copies of these records and tests, as well as the records of corrective action taken, shall be furnished to the Board daily. Format of report shall be as prescribed in the Special Provisions.

3. DEFINITIONS AND NOMENCLATURE.

3.1 **Paint.** The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, and other coatings, organic or inorganic, whether they be used as prime, intermediate, or finish coats. This definition does not include troweled or sprayed-metal coatings.

3.2 **Shop Painting.** The term "shop painting" as referred to herein and/or on the drawings covers surface preparation and painting operations conducted in a shop, mill, or plant, before shipment of paint-receiving items to the project site.

3.3 **Field Painting.** The term "field painting" as referred to herein and/or on the drawings covers surface preparation and painting operations conducted at the project site.

3.4 Touchup Painting. The term "touchup painting" refers to the application of paint on small areas of painted surfaces to repair mars, scratches, and other defects where the coating has deteriorated in order to restore the coating to an unbroken condition.

3.5 Repainting. The term "repainting" designates the cleaning and recoating with the same or similar materials originally used on extensive areas on which the existing coatings have deteriorated or otherwise have not provided adequate protection.

3.6 Surface Not to be Painted. Paint shall not be applied to grease fittings, rubber, corrosion-resisting steel, non-ferrous finishes or machined surfaces. Metal embedded (unexposed) in concrete shall not be painted.

4. APPLICABLE PUBLICATIONS.

4.1 American Society for Testing and Materials (ASTM) Publications.

ASTM D 362	Industrial Grade Toluene
ASTM D 520	Zinc Dust (Metallic Zinc Powder)
ASTM D 561	Carbon Black
ASTM D 740	Methyl Ethyl Ketone
ASTM D 846	Ten-Degree Xylene
ASTM D 1153	Methyl Isobutyl Ketone
ASTM D 1200	Viscosity of Paints, Varnishes and Lacquers by Ford Viscosity Cup
ASTM D 1210	Fineness of Dispersion of Pigment-Vehicle Systems
ASTM E 97	45-deg., 0-deg. Directional Reflectance Factor of Opaque Specimens by Broad-Band Filter Reflectometry

4.2 Compressed Gas Association, In. (CGA).

Pamphlet G-7.1	Commodity Specification for Air Available from: Compressed Gas Assoc., Inc., 500 Fifth Avenue New York, NY 10036
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4.3 Federal Standards (Fed. Std.).

No. 595a & Change
Notice 4

Colors

No. 141a & Change
Notice 1, 2, 3, 4

Paint Varnish, Lacquer and
Related Material; Methods of
Inspection, Sampling and
Testing

4.4 Steel Structures Painting Council (SSPC).

SSPC-SP 3

Power Tool Cleaning

SSPC-SP 5

White Metal Blast Cleaning

SSPC-SP 7

Brush-Off Blast Cleaning

SSPC-Paint 16

Coal Tar Epoxy-Polyamide Black
(or Dark Red) Paint

4.5 Special Formulations. Special formulations indicated herein that are not covered by Federal or other nationally recognized standard specifications are specified below in 9-9.

5. SAMPLING AND TESTING.

5.1 General. Batches of paint which the Contractor proposes to use shall be stored in an approved shelter on the project site or segregated at the source of supply sufficiently in advance of need to allow 30 days for sampling and testing. The Contractor shall notify the Chief Engineer when the paint is available for sampling. Sampling of each batch will be witnessed by a representative of the Chief Engineer unless otherwise specified or directed. Samples of paint submitted for approval shall be clearly labeled to indicate formula or specification number and nomenclature, batch number, batch quantity, color, date made and applicable project contract number. Where specifically indicated herein or where indicated in a standard specification for a finished product, separate samples of ingredient materials shall be furnished. The ingredient samples shall be clearly identified by commercial name, trade designation, manufacturer, batch or lot number and such other data as may be required. Shipment of samples shall be at the Contractor's expense. Testing of paint for compliance with the specifications will be performed in a Board designated laboratory at no expense to the Contractor except that the cost of testing any sample representing material that replaces previously rejected material will be deducted from payments to the Contractor at the rate of \$300.00 dollars for each replacement sample.

5.2 Special Paint Formulations Not Covered by Standard Specifications. Except as otherwise indicated, inspection and tests will be performed in accordance with the applicable provisions of Fed. Std. 141a and Change Notices 1, 2, 3, & 4. Test method numbers indicated in paragraph 9 are, unless otherwise stated, taken from the referenced standard.

5.2.1 Solvents in vinyl and epoxy paints and thinners are subject to analysis by programmed temperature gas chromatographic methods and/or spectrophotometric methods, employing the same techniques which give reproducible results on prepared control samples known to meet the specifications. If the solvent being analyzed is of the type consisting primarily of a single chemical compound (or a mixture of two or more such solvents) interpretation of the test results shall take cognizance of the degree of purity of the individual solvent as commercially produced for the paint industry.

5.2.2 Adhesion Test. All vinyl paints are subject to the following adhesion test. When V-766 or V-106 formulations are tested, 5 to 7 mils (dry) shall be spray applied to a mild steel panel sandblasted to white metal. When V-102 or V-103 formulations are tested, they shall be spray applied between 1.5 and 2.5 mils (dry) of V-766 or V-106 known to pass this test. When VZ-108d is tested, the coating shall be mixed in the proper proportions and then spray applied to dry film thickness of 1.5 and 2.5 mils above the sandblast profile. The VZ-103d shall be topcoated with a V-766e known to pass this test. In all cases, the complete system shall have a total dry film thickness of 5-7 mils above the sandblast profile. After being air dried for 2 hours at room temperature, the panel shall be dried in a vertical position for 16 hours at 120°F. After cooling for 1 hour, the panel shall be immersed in tap water at 85-90°F for 48-72 hours. Immediately upon removal, the panel shall be dried with a soft cloth and examined for adhesion as follows: With a pocket knife or other suitable instrument, two parallel cuts at least 1-inch long shall be made 1/4-inch to 3/8-inch apart through the paint film to the steel surface. A third cut shall be made perpendicular to and passing through the ends of the first two. With the tip of the knife blade, the film shall be loosened from the panel from the third cut between parallel cuts for a distance of 1/8-inch to 1/4-inch. With the panel being held horizontal, the free end of the paint film shall be grasped between the thumb and forefinger and pulled vertically so as to remove the film as a strip from between the first two cuts. The strip of paint film shall be removed at a rate of approximately 1/10-inch per second, and shall be maintained in a vertical position during the process of removal. Upon being removed by this method, the paint film

shall either break or elongate a minimum of 10 percent. Paints not intended to be self priming shall exhibit no delamination from the primer.

6. SUBMITTALS.

6.1 Special Formulation Paints and Thinners. One quart of each component of Coal Tar Epoxy Paint, and two 1-quart samples of each batch of each type and color of all other paint and thinners shall be submitted to the Chief Engineer for approval. For ingredient materials submittal requirements, see paragraph 9.4, Paint Formulations. When the required quantity of any type is 10 gallons or less, samples of the paint and ingredient materials need not be submitted but instead the Contractor shall submit a signed certificate from the paint manufacturer showing the percentage of each ingredient used to produce the material and a statement that the material complies with all of the requirements of the formulation. Each ingredient shall be clearly identified as provided for above.

7. PACKAGING, LABELING, DELIVERY, AND STORAGE OF PAINTS. Paints shall be so processed and packaged as to insure that within a period of 1 year from date of manufacture, they will not gel, liver or thicken deleteriously, or form gas in the closed container. Paints, unless otherwise specified or permitted, shall be packaged in standard containers not larger than 5 gallons in size, with removable friction or lug-type covers. Containers for vinyl-type paints shall be lined with a coating resistant to the solvents in the formulations and capable of effectively isolating the paint from contact with the metal container. Each container of paint or separately packaged component thereof shall be clearly and durably labeled to indicate the purchaser's order number, date of manufacture, manufacturer's batch number, quantity, color, component identification, and the designated name and formula or specification number of the paint together with special labeling instructions, when specified. Paint shall be delivered to the job in unbroken containers. Paints that can be harmed by exposure to cold weather shall be stored in ventilated, heated shelters. All paints shall be stored under cover from the elements and in locations free from sparks and flames.

8. SAFETY PROVISIONS. The safety provisions contained herein are in addition to those listed in the SPECIAL CLAUSES.

8.1 Abrasive Blasing.

8.1.1 Hoses and Nozzles. Hose of a type to prevent shocks from static electricity shall be used. Hose lengths shall be joined by metal couplings to the outside of the hose to avoid erosion and weakening of the couplings. The couplings shall be fastened together in a way which will prevent accidental disengagement. Nozzles shall be attached to the hose by fittings

that will prevent the nozzle from unintentionally becoming disengaged. Nozzle attachments shall be of metal and shall fit onto the hose externally. A dead man control device shall be provided at the nozzle end of the blasting hose to cut off the flow in the event the blaster loses control of the hose. Hoses and all fittings used for abrasive blasting shall be inspected frequently to insure timely replacement before an unsafe amount of wear has occurred.

8.1.2 Blasting Helmets. Abrasive blasters under all circumstances shall be protected by air-line fed abrasive blasting helmets of a positive pressure type certified by the National Institute for Occupational Safety and Health (NIOSH) or the Mining Enforcement Safety Administration (MESA). Breathing air, source of supply, and other respirator criteria shall meet the same requirements as set forth in 9A-8.6.2 below for spray painting.

8.1.3 Protective Clothing. The blaster shall be protected against injury from exposure to the blast by appropriate protective clothing including gloves.

8.1.4 Workers other than blasters working in areas where unsafe concentrations of abrasive materials and dusts are present, shall be protected by safety goggles and filter type dust respirators. The safety goggles shall be kept clean, fit well, contain lenses of unbreakable glass or plastic, and allow adequate peripheral as well as straight ahead vision. Persons whose vision requires the use of corrective lenses in spectacles shall wear safety goggles that can be worn over the spectacles without disturbing the adjustment of the spectacles. The filter type dust respirators shall be certified by NIOSH or MESA of dusts not significantly more toxic than lead.

8.2 Cleaning with Compressed Air. The cleaning with compressed air, the same safety provisions as required for abrasive blasters in 9-8.1 above, including the use of air-line fed abrasive blasting helmets, shall apply.

8.3 Cleaning with Solvents.

8.3.1 Ventilation. Either natural ventilation or mechanical exhaust ventilation shall be used to remove the vapor at the source and to dilute the concentration of vapors in an inclosed working space to a concentration which is safe for the entire work period.

8.3.2 Work Areas without Ventilation. Employees shall be protected against organic vapors in work areas without ventilation by respirators certified by NIOSH or MESA.

8.3.3 Protective Clothing. Exposure of skin and eyes shall be avoided by use of butyl gloves and apron, and safety goggles. The safety goggles shall meet the same requirements as specified above in 9A-8.1.

8.4 Pretreatment of Metals and Concrete with Phosphoric Acid or Similar Type Acids. Workers shall use chemical faceshields and butyl gloves and aprons. An eye lavage and deluge shower shall be provided for shop application. If eyes should be contaminated, copious quantities of water shall be used to irrigate the eyes for at least 15 minutes. Medical attention should be sought.

8.5 Mixing Epoxy Resin Formulations. Local exhaust ventilation shall be provided in the area where the curing agent and resin are mixed. The exhaust ventilation shall be capable of providing 100 feet per minute of air flow at the mixing station. Butyl gloves and apron and a chemical face shield must be worn when mixing epoxy resin paints. Contact with skin shall be avoided. Smoking shall be prohibited. For shop application an eye lavage and deluge shower shall be provided in the mixing area. If eyes should be contaminated, copious quantities of water shall be used to irrigate the eyes for at least 15 minutes. Medical attention should then be sought. Where no more than 10 gallons of epoxy formulations are mixed, an eye lavage and deluge shower are not required.

8.6 Paint Application.

8.6.1 Fire and Explosion Prevention.

8.6.1.1 Ventilation. For painting in inclosed spaces with paint made of volatile organic solvents, sufficient exhaust ventilation shall be provided to exchange the air in the inclosed spaces with fresh air at the rate of 5,000 cfm for each spray gun in operation. All parts of inclosed spaces shall be swept by moving air. The air in inclosed spaces shall be safe at all times from fire and explosion hazards as determined by a calibrated explosimeter or organic vapor analyzer. Exhaust ducts shall discharge clear of working areas and away from sources of possible ignition. Periodic tests shall be made to ensure that the exhausted vapors are not accumulating in other areas. If the ventilation fails, painting shall be stopped and the compartment shall be evacuated until sufficient exhaust ventilation is provided. Ventilation shall be continued after the completion of painting until the paint film is no longer giving off appreciable amounts of solvent vapors. The final determination as to whether appreciable amounts of solvent vapors are given off shall be made after the ventilating equipment has been shut off for at least ten minutes.

8.6.1.2 Explosion Proof Equipment. All electrical wiring, lights, and other equipment located in a spraying area where a concentration of solvent vapors may occur shall be of an

explosion-proof type approved by the Underwriters' Laboratories for Class I, Division 1, Group D, Hazardous Locations. Electrical wiring, motors, and other equipment outside of, but within 20 feet of any spraying area, shall not produce sparks under normal operating conditions and shall otherwise conform to the provisions for Class I, Division 2, Group D, Hazardous Locations. Electric motors driving exhaust fans shall not be placed inside spraying areas or ducts. Fans shall have nonferrous blades. Portable air ducts shall also be nonferrous materials. All motors and associated control equipment shall be properly maintained and grounded. The metallic parts of air moving devices, spray guns, connecting tubing, and all duct work shall be electrically bonded and the bonded assembly grounded.

8.6.1.3 Further Precautions. Workers shall wear non-sparking safety shoes. All solvent drums taken into the spraying area shall be placed on non-ferrous surfaces and shall be grounded. Metallic contact shall be maintained between containers and drums when materials are being transferred from one to another. A competent person shall inspect all power and lighting cables to ensure that the insulation is in excellent condition, free of all cracks and worn spots, that there are no connections within fifty (50) feet of the operation, that lines are not overloaded, and that they are suspended with sufficient slack to prevent undue stress or chafing. No matches, lighted cigarettes, cigars, or pipes, and no cigarette lighters shall be taken into the area where work is being done. Conspicuous "NO SMOKING" signs shall be posted at all flammable materials spraying areas and storage areas. Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use.

8.6.2 Health Protection.

8.6.2.1 Respirators. All persons in the area of spray painting operations shall wear an air purifying mask or mouthpiece respirator with chemical cartridge and appropriate filter. Where paint containing high concentrations of volatile organic solvents is being used, continuous flow air-line respirators certified by NIOSH or MESA shall be used. In inclosed spaces, respirators shall be equipped with a pressure control valve with a quick disconnect feature that activates an automatic shutoff to stop air flow when disconnected, a pressure regulator, and in-line air filters for removal of dusts, mists, fumes, and smokes from the source of air supply. The air line couplings shall be incompatible with outlets for other gas systems.

8.6.2.2 Breathing Air. Breathing air shall meet the requirements of the specification Grade D breathing air as described in the CGA Pamphlet G-7.1.

8.6.2.3 Air Compressor. A breathing air type of air compressor shall be used as the source of air supply. If an oil-lubricated compressor is used to provide breathing air for the respirators, it shall be equipped with a high-temperature alarm or carbon monoxide alarm, or both. If only a high temperature alarm is used, frequent testing of the compressor air will be necessary.

8.6.2.4 Protective Clothing. Workers shall wear cotton work clothes, which cover arms and legs, and gloves.

8.6.2.5 Protective Program. A respiratory protective program for the use and maintenance of respirators shall be established. The program shall include instructing and training in the proper use and maintenance of respirators and their limitations. The training shall provide the user an opportunity to handle the respirator, have it fitted properly, test its face-piece-to-face-seal, wear it in normal air for a long familiarity period, and finally, to wear it in a test atmosphere. When the user must wear corrective spectacles or corrective lenses as part of the face-piece, they shall be worn so as to provide good vision, comfort, and a gas-tight face-piece-to-face-seal. The maintenance program shall provide for the inspection for defects (including a leak check), cleaning and disinfecting, repair, and storage.

8.6.2.6 Medical Status. The respirator user's medical status shall be determined by a physician and reviewed periodically (for instance, annually). Persons shall not be assigned to tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work and use the equipment and have no illness which may be aggravated by intended painting operations.

PART 2 - PRODUCTS

9. SPECIAL PAINT FORMULATIONS NOT COVERED BY STANDARD SPECIFICATIONS.

9.1 Exceptions. The ingredient materials described in this section are applicable only to the special paint formulations specified hereinafter and not to those finished-product coatings governed by Federal or other standard specifications.

9.2 General. Special paints shall have the composition as indicated in the formulas listed herein. Test method numbers indicated herein are, unless otherwise stated, taken from Fed. Std. 141a and Change Notices 1, 2, 3 & 4.

9.3 Colors and Tints. Colors shall conform to the listed chip of Fed. Std. 595a and Change Notice 4, "Colors". If not specified or otherwise prescribed, the color shall be that naturally obtained from the required pigmentation.

9.4 Paint Formulations.

9.4.1 Reserved.

9.4.2 Reserved.

9.4.3 Vinyl-Type White (or Gray) Paint.

9.4.3.1 Formula V-766e:

<u>Ingredients</u>	<u>Percent by Weight</u>
Vinyl Resin, Type 3	5.6
Vinyl Resin, Type 4	11.6
Titanium Dioxide and (for Gray) Carbon Black	13.0
Diisodecyl Phthalate	2.9
Methyl Isobutyl Ketone	32.0
Toluene	34.7
Ortho-Phosphoric Acid	.2
	<u>100.0</u>

9.4.3.1.1 Processing. The dispersion of pigment in this paint shall be accomplished by means of pebble mills or other approved methods to produce a fineness of grind (ASTM D 1210) of not less than 7 on the Hegman scale. Grinding of this formulation in steel-lined or steel-ball mills will not be permitted. No grinding aids, antissettling agents, or any other materials except those shown in the formula will be permitted. The paint shall show the proper proportions of specified solvents when analyzed by chromatographic and/or spectrophotometric methods. The ortho-phosphoric acid shall be measured with great care and diluted with at least four parts of ketone to one part of acid. It shall be slowly incorporated into the finished paint with constant and thorough agitation.

9.4.3.1.2 Phosphoric Acid. The ortho-phosphoric acid shall be measured with great care and diluted with at least four parts of methyl isobutyl ketone to one part of acid. It shall be slowly incorporated into the finished paint with constant and thorough agitation.

9.4.3.1.3 Viscosity. The viscosity of this paint should not exceed 90 seconds using a No. 4 Ford cup (ASTM D 1200).

9.4.3.1.4 Adhesion Test. This paint is subject to the adhesion test for vinyl paint outlined previously in 9A-5.2.2.

9.4.3.1.5 Colors. The white and gray paints shall be furnished in the volume ratio designated by the purchaser. The gray paint shall contain no pigments other than those specified. Enough carbon black shall be included to result in the dry paint film having a reflectance of 20-24 (ASTM E 97). The resulting gray color shall approximate but not necessarily match color 26595 of Fed. Std. 595a and Change Notice 4.

9.4.3.1.6 Samples. Except for batches of 10 gallons or less, samples of this paint submitted for approval shall include separate samples of all ingredient materials.

9.4.4 Reserved.

9.4.5 Reserved.

9.4.6 Reserved.

9.4.7 Reserved.

9.4.8 Coal Tar Epoxy (Black) Paint (Formula C-200): This paint shall conform to SSPC-Paint 16, except that: (a) container labels shall include the term, "(Corps of Engineers Formula C-200)," in addition to and following the SSPC specification designation, (b) the gelling agent used in its manufacture shall be Gelling Agent C as described in paragraph 3.7.7 of SSPC Paint 16, (c) Component A may be packaged in containers as large as 6 gallons in size, and (d) finished product samples submitted for approval shall be accompanied by a list showing all of its raw material ingredients, the name of the manufacturer of each and the trade name and/or code designation by which the producer identifies his ingredient product.

9.5 Ingredients Materials and Thinners for Special Paint Formulations. The following ingredient materials apply only to those paints whose formulations are shown in the specifications above in detail.

9.5.1 Pigments and Suspending Agents.

9.5.1.1 Carbon Black. Carbon black shall conform to ASTM D 561, Type I or II.

9.5.1.2 Titanium Dioxide. The titanium dioxide in vinyl paint Formula V-766e shall be one of the following: Titanox 2160, 2201, Titanium Pigment Corp.; Ti-Pure 960, E. I. DuPont Denemours and Co., Inc.; Unitane OR-650, American Cyanamid Co.; Zopaque R-88S, Glidden Pigments.

9.5.2 Resins, Plasticizer and Catalyst.

9.5.2.1 Diisodecyl Phthalate shall have a purity of not less than 99.0 percent, shall contain not more than 0.1 percent water and shall have an acidity (calculated as acetic acid) of not more than 0.005 percent by weight.

9.5.2.2 Vinyl Resin, Type 3. Vinyl resin, Type 3 shall, be a vinyl chloride-acetate copolymer of medium average molecular weight produced by a solution polymerization process and shall contain 85 to 88 percent vinyl chloride and 12 to 15 percent vinyl acetate by weight. The resin shall have film-forming

properties and shall, in the specified formulations, produce results equal to "Vinylite" resin VYHH, as manufactured by the Union Carbide Corporation.

9.5.2.3 Vinyl Resin, Type 4. Vinyl resin, Type 4, shall be a copolymer of the vinyl chloride-acetate type produced by a solution polymerization process, shall contain (by weight) 1 percent interpolymerized dibasic acid, 84 to 87 percent vinyl chloride, and 12 to 15 percent vinyl acetate. The resin shall have film-forming properties and shall, in the specified formulations, produce results equal to "Vinylite" resin VMCH as manufactured by the Union Carbide Corporation.

9.5.2.4 Orthophosphoric Acid shall be a chemically pure 85 percent grade.

9.5.3 Solvents and Thinners.

9.5.3.1 Methyl Ethyl Ketone (MEK) shall conform to ASTM D 740.

9.5.3.2 Methyl Isobutyl Ketone (MIBK) shall conform to ASTM D 1153.

9.5.3.3 Toluene shall conform to ASTM D 362.

PART 3 - EXECUTION

10. CLEANING AND PREPARATION OF SURFACES TO BE PAINTED.

10.1 General. Surfaces to be painted shall be clean before applying paint or surface treatments. The removal of oil and grease shall, in general, be accomplished with mineral spirits or other low-toxicity solvents having a flashpoint above 100°F before any mechanical cleaning is started. Solvent cleaning shall be done with clean cloths and clean fluids to avoid leaving a thin film of greasy residue on the surfaces being cleaned. Cleaning and painting shall be so programmed that dust or other contaminants from the cleaning process do not fall on wet, newly painted surfaces, and surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Welding or, in the vicinity of, previously painted surfaces shall be conducted in a manner to prevent weld spatter from striking the paint and to otherwise reduce coating damage to a minimum; paint damaged by welding operations shall be restored to original condition. Machinery shall be protected against entry of blast abrasive and dust into working parts. Surfaces to be painted that will be inaccessible after construction, erection, or installation operations are completed shall be painted before they become inaccessible.

10.2 Ferrous Surfaces. Ferrous surfaces subject to extended periods of immersion or otherwise as required shall be dry blast cleaned to a grade approaching White Metal grade which

shall be in accordance with SSPC-SP 5, except that paragraphs 5.2.4 and 6.1.4 shall not be applicable and except that a limited relaxation from the uniform White Metal grade of surface cleanliness will be permitted, as described below. The metal shall be cleaned to such a degree that if a large surface were divided approximately into 6-inch squares, at least 75 percent of the subdivisions would meet the White Metal grade of cleanliness and the remaining subdivisions would be randomly distributed. Within these small, randomly distributed areas a minor relaxation from White Metal cleanliness will be permitted, consisting only of very slight shadows, stains, and discolorations stemming from very thin, adherent, sparsely scattered residues of mill scale and corrosion products. No relaxation from the White Metal grade will be permitted on surface irregularities such as edges, interior angles, welds, rivet lines, and junctions of joining members. The overall blasting effort expended shall be not less than two-thirds (2/3) of that which would be required to accomplish the White Metal grade of cleanliness on the specific surfaces involved, but this limitation shall not be construed as a waiver of any of the requirements above. Weld spatter not dislodged by blasting shall be removed with impact or grinding tools. Surfaces shall be dry at the time of blasting. Blast cleaning to a grade approaching White Metal shall be done in the field and, unless otherwise specifically authorized, after final erection. Within 8 hours after cleaning, prior to the deposition of any detectable moisture, contaminants, or corrosion, all ferrous surfaces blast cleaned to a grade approaching White Metal shall be cleaned of dust and abrasive particles by brushing, vacuum cleaning, and/or blowdown with clean, dry compressed air, and given the first coat of paint. All abrasives used in sandblasting operations shall contain less than 1% silica, unless otherwise approved in writing, by the Chief Engineer. Compliance with this requirement shall be certified in writing by a qualified testing (analytical) laboratory or by the manufacturers material safety data sheet. Upon written request by the Contractor, the Chief Engineer may authorize mill or shop cleaning of assembled or partially assembled components specified to receive vinyl-type paint systems. The surfaces if shop blasted, shall be shop coated with the first and second coats of the specified paint system. The shop coating shall be maintained in good condition by cleaning and touching up in areas damaged during the construction period. Appearance of pinpoint or general rusting prior to application of field coats will be considered as evidence of poor workmanship, requiring reblasting and repainting at no added cost to the Board. Prior to the field application of subsequent coats, soiled areas of the shop coating shall be thoroughly cleaned and all welds or other unpainted or damaged areas shall be cleaned and coated in such a manner as to make them equivalent to adjacent, undamaged paint surfaces.

11. PAINT APPLICATION.

11.1 General. The finished coating shall be free from holidays, pinholes, bubbles, runs, drops, ridges, waves, laps, unnecessary brush marks, and variations in color, texture, and gloss. Application of initial or subsequent coatings shall not commence until a Board representative has verified that atmospheric conditions and the surfaces to be coated are satisfactory or has waived specific verification. All paint coats shall be applied in such manner as to produce an even, continuous film of uniform thickness. Edges, corners, crevices, seams, joints, welds, and other surface irregularities shall receive special attention to insure that they receive an adequate thickness of paint. Spray equipment shall be equipped with traps and separators and where appropriate, mechanical agitators, pressure gages, pressure regulators, and screens or filters. Air caps, nozzles, and needles shall be as recommended by the spray equipment shall be used only on broad, flat, or otherwise simply configured surfaces, except that it may be employed for general painting if the spray gun is equipped with dual tips of proper types and orifice sizes.

11.2 Mixing and Thinning. Paints shall be thoroughly mixed, strained where necessary, and kept at a uniform composition and consistency during application. Paste or dry powder pigments specified to be added at the time of use shall, with the aid of powered stirrers, be incorporated into the vehicle or base paint in such a manner as to produce a smooth, homogeneous mixture, free of lumps and dry particles. Where necessary, in the opinion of the inspector, to suit conditions of surface, temperature, weather, and method of application, the packaged paint may be thinned immediately prior to use by the addition of not more than one pint per gallon of the proper thinner, provided that this general limitation shall not apply when more specific thinning instructions are provided. Paint that has been stored at low temperature, shall be brought up to at least 70°F before being mixed and thinned, and its temperature in the spray tank or other working container shall not fall below 60°F during the application. Paint that has deteriorated in any manner to such degree that it cannot be restored to essentially its original condition by customary field-mixing methods shall not be used and shall be removed from the project site. Paint and thinner that is more than 1 year old shall be sampled and submitted for testing to determine its suitability for application.

11.3 Atmospheric and Surface Conditions. Paints shall be applied only to surfaces that are above the dewpoint temperature and that are completely free of moisture as determined by sight and touch. In no case shall any paint be applied to surfaces upon which there is detectable frost or ice. Except as otherwise specified, the temperature of the surfaces to be painted and of air in contact therewith shall be not less than 45°F during paint application nor shall paint be applied if the surfaces can be

expected to drop to 32°F or lower before the film has dried to a reasonably firm condition. During periods of inclement weather, painting may be continued by enclosing the surfaces and applying artificial heat, provided the minimum temperatures and surfaces dryness requirements prescribed above are maintained. Paint shall not be applied to surfaces heated by direct sunlight or other sources to temperatures that will cause detrimental blistering, pinholing, or porosity of the film.

11.4 Time Between Surface Preparation and Painting. Surfaces that have been cleaned and/or otherwise prepared for painting shall be primed as soon as practicable after such preparation has been completed, but in any event, prior to any deterioration of the prepared surface.

11.5 Method of Paint Application. Unless otherwise specified, paint shall be applied by brush or spray to ferrous and nonferrous metal surfaces. Special attention shall be directed toward insuring adequate coverage of edges, corners, crevices, bolts, welds, and similar surface irregularities. Other methods of application to metal surfaces shall be subject to the specific approval of the Contracting Officer. Whenever application of paint by a specific method to a surface is permitted or directed, it is to be understood that all areas inaccessible to that method shall be coated by alternate means.

11.6 Coverage and Film Thickness. The actual surface area covered per gallon of paint shall not exceed the spreading rates prescribed for specific paints. Where no spreading rate is specified, the paint shall be applied at a rate normal for the type of material being used. In any event, the combined coats of a specified paint system shall completely hide the base surface and the finish coats shall completely hide undercoats of dissimilar color. Where dry film thickness requirements are specified for coatings on ferrous surfaces, measurements shall be made with one of the thickness gages listed below. They shall be calibrated on metal practically identical in composition and surface preparation to that being coated and be of substantially the same thickness except that for measurements on metal thicker than 1/4-inch the instrument may be calibrated on metal with a minimum thickness of 1/4-inch. When calibrating any of the gages for making film measurements of over 3 mils, the calibrating thickness standards (shims) shall be of nonmetallic composition. Where only one thickness is specified, i.e., either a minimum or an average, the calibrating shim's thickness shall closely approximate an average of the two. Calibrating instructions, thickness standards, and in the case of the Mikrotest gage, a calibrating tool, should be obtained from the manufacturer or supplier of the gage. Authorized thickness gages:

General Electric, Type B, General Electric Company
Mikrotest, Elektrophysik - Koln
Elcometer, Elcometer Instruments, Ltd.
Inspector Gage, Elcometer Instruments, Ltd.
Minitector, Elcometer Instruments, Ltd.

11.7 Progress of Painting Work. Where field painting on any type of surface has commenced, the complete painting operation, including priming and finishing coats, on that portion of the work, shall be completed as soon as practicable, without prolonged delays. Sufficient time shall elapse between successive coats to permit them to dry properly for recoating, and this period shall be modified as necessary to suit adverse weather conditions. Paint shall be considered dry for recoating when it feels firm, does not deform or feel sticky under moderate pressure of the finger, and the application of another coat of paint does not cause such film irregularities such as lifting or loss of adhesion of the undercoat. All coats of all painted surfaces shall be unscarred and completely integral at the time of application of succeeding coats. At the time of application of each successive coat, undercoats shall be cleaned of dust, grease, or foreign matter by means of airblast, solvent cleaning, or other suitable means. Cement and mortar deposits on painted steel surfaces, not satisfactorily removed by ordinary cleaning methods, shall be brushoff blast cleaned and completely repainted as required. Undercoats of high gloss shall, if necessary for establishment of good adhesion, be scuff sanded, solvent wiped, or otherwise treated prior to application of a succeeding coat. Field coats on metal shall be applied after erection except as otherwise specified and except for surfaces to be painted that will become inaccessible after erection.

11.8 Contacting Corrosion Resisting and Clad Metal Surfaces. When bolted contact is to exist between surfaces of ferrous or other metal parts of substantially similar chemical composition, such surfaces will not be required to be painted but any resulting crevices shall subsequently be filled or sealed off with paint. Contacting metal surfaces formed by high-strength bolts in friction-type connections shall not be painted. Where a nonmetal surface is to be in bolted with a metal surface, the contacting surfaces of the metal shall be cleaned and given three coats of the specified primer. Unless otherwise specified, corrosion-resisting metal surfaces, including cladding therewith, shall not be painted.

11.9 Drying Time Prior to Immersion. Painted surfaces that are to be immersed in water shall be permitted a final drying time as long as practicable, but in any event the following minimum requirements shall be met. Coal tar-epoxy systems shall not be immersed until the final coat has dried at least 5 days. Vinyl-type paint systems shall not be immersed until the final coat has dried at least 3 days. The cold-applied coal tar system shall not be immersed until the final coat has dried at least 7

days. Minimum drying periods may be required to be increased up to twofold if the drying temperature is below 65°F and/or if the immersion exposure involves considerable abrasion.

11.10 Protection of Painted Surfaces. Where shelter and/or heat are provided for painted surfaces during inclement weather such protective measures shall be maintained until the paint film has dried, and discontinuance of the measures is authorized. Items that have been painted shall not be handled, worked on, or otherwise disturbed until the paint coat is fully dry and hard. All metalwork coated in the shop or field prior to final erection shall be stored out of contact with the ground in such manner and location as will minimize the formation of water-holding pockets, soiling, contamination, and deterioration of the paint film, and damaged areas of paint on such metalwork shall be cleaned and touched up without delay.

11.11 Special Directions for Mixing and Applying Vinyl Paints.

11.11.1 General. Vinyl paints shall be spray applied, except that areas inaccessible to spraying shall be brushed. All of the vinyl paints require thinning for spray application. The amount of thinner shall be varied to suit the specific paint and prevailing temperature and wind conditions, and shall at all times be sufficient to provide a wet spray and avoid deposition of particles that are semi-dry when they strike the surface. Vinyl paints shall not be applied when the temperature of the ambient air and receiving surfaces is less than 35°F nor when the receiving surfaces are higher than 125°F. Each spray coat of vinyl paint contemplated by these specifications shall consist of a preliminary, extra spray pass on edges, corners, interior angles, seams, crevices, junctions of joining members, weld lines and similar surface irregularities followed by an overall double spray coat (single spray coat for glass flake-containing formulas). A double spray coat of vinyl type paint shall consist of applying paint to a working area of not less than several hundred square feet in a single, half-lapped pass at a coverage rate of 255 to 325 square feet per gallon or as otherwise required to provide a dry film thickness of 0.75 mils, followed after drying to at least a near tack-free condition by another spray pass applied at the same coverage rate and where practicable at right angles to the first. Bolts and similar surface projections shall receive sprayed paint from every direction in order to insure complete coverage of all faces. Pits, cracks, and crevices shall be filled with paint insofar as practicable, but in any event all pit surfaces shall be thoroughly covered and all cracks and crevices shall be sealed off against the entrance of moisture. Fluid and atomization pressures shall be kept as low as practicable consistent with good spraying results. Application of vinyl-type paints by means of hot sprays or airless spray equipment will not be permitted, provided that not more than 2.0 mils (dry film thickness) per

double coat is applied, provided the characteristics of the dried coating are not inferior to those of a properly applied conventionally sprayed coating; and provided that airless spray shall be used only on broad, flat or otherwise simply configured surfaces. Under coats shall be dry before recoating and not more than two double spray coats shall be applied in one day.

11.11.2 Vinyl Paint (Formula V-766e) is a ready-mixed paint designed to be spray applied over a wide range of ambient temperatures by field thinning with the proper type and amount of thinner. Optional formulations are available which comply with existing air pollution regulations and may be used on projects located in areas where such regulations cannot be circumvented provided "Exempt" (acceptable) field-added thinners are used. For spray application they shall be thinned as necessary up to approximately 25 percent (1 quart per gallon of base paint); when the ambient and steel temperatures are above normal, up to 40 percent thinning may be necessary for satisfactory application. V-766e paint containing field-added abrasive shall be applied only with conventional air-atomization spray equipment including an air driven stirrer capable of keeping the paint homogeneous.

11.12 Special Directions for Mixing and Applying Coal Tar Epoxy (Black) Paint (Formula C-200).

11.12.1 Mixing. Component B shall be added to previously stirred Component A and thoroughly mixed together with a heavy-duty mechanical stirrer just prior to use. The use of not more than 1 pint of xylene thinner per gallon of paint will be permitted in order to improve application properties and extend pot life. Where applicable, an approved thinner which complies with air pollution regulations shall be substituted for xylene. The pot life of the mixed paint, extended by permissible thinning, may vary from 2 hours in very warm weather to five or more hours in cool weather. Pot life in warm weather may be extended by: precooling the components prior to mixing; cooling the mixed material; and/or by slow, continuous stirring during the application period. The mixed material shall in any event be applied before unreasonable increases in viscosity take place.

11.12.2 Application. Spray guns shall be of the conventional type equipped with a fluid tip of about 0.09-inch diameter and external atomization, 7-hole air cap. Material shall be supplied to the spray gun from a bottom withdrawal pot or by means of a fluid pump; hose shall be 1/2-inch in diameter. Atomization air pressure shall not be less than 80 p.s.i. High-pressure airless spray equipment may be used only on broad, simply configured surfaces. Brush application shall be carried out with a stiff-bristled tool heavily laden with material and wielded in a manner to spread out the coating smoothly and quickly without excessive brushing. The coverage rate of the material is approximately 110 square feet per gallon per coat to obtain 20 mils (dry thickness) in a 2-coat system. The minimum

amount of paint applied in any coat shall be such that the deposited material flows together and provides a coherent, pin-hole-free film. To promote uniformity of thickness the direction of the spray passes (or finish strokes if brushed) of the second coat shall be at right angles to those of the first where practicable.

11.12.3 Subsequent Coats. Except at the high temperatures discussed below, the drying time between coal tar epoxy coats shall be not more than 72 hours, and application of a subsequent coat as soon as the undercoat is reasonably firm is strongly encouraged. Where temperature for substrate or coating surface during application or curing exceeds or can be expected to exceed 125°F as the result of direct exposure to sunlight, either the surfaces shall be shaded by overhead cover or the interval between coats shall be reduced as may be found necessary to avoid poor intercoat adhesion, here defined as inability of two or more dried coats of coal tar epoxy paint to resist delamination when tested aggressively with a sharp knife. Under the most extreme conditions involving high ambient temperatures and sun-exposed surfaces, the drying time between coal tar epoxy coats shall not exceed 10 hours, and the reduction of this interval to a few hours or less is strongly encouraged. Where the curing time of a coal tar epoxy undercoat exceeds the above (i.e., 72 hours of curing at normal temperatures or 10 hours at extreme conditions), or where the undercoat develops a heavy blush, frequently caused by its being subjected to moisture soon after application, it shall be given one of the following treatments before the subsequent coat is applied:

(a) Etch the coating surface lightly by brush-off blasting, using fine sand, low air pressure and nozzle-to-surface distance of approximately 3 feet.

(b) Remove the blush and/or soften the surface of the coating by wiping it with cloths dampened with N, N-Dimethyl Formamide solvent or with Bitumastic 2CB solvent marketed by the Koppers Company, Inc. The solvents may be applied to the surface by fog spraying followed by wiping, but any puddles of solvent must be mopped up immediately after they form. The subsequent coat shall be applied in not less than 15 minutes or more than 3 hours after the solvent treatment.

11.12.4 Ambient Temperature. Coal tar epoxy paint shall not be applied when the receiving surface or the ambient air is below 50°F nor unless it can be reasonably anticipated that the average ambient temperature will be 50°F or higher for the 5-day period subsequent to the application of any coat.

11.12.5 Safety. In addition to the safety provisions in 9-8 above, other workmen as well as painters shall take extra care to avoid inhaling atomized particles of coal tar epoxy paint and to avoid contact of the paint with the skin.

12. PAINT SYSTEMS TO BE APPLIED - NUMBER OF COATS AND FORMULAS.

12.1 General. The required paint systems and the surfaces to which they shall be applied are shown in 9A-12.2 below. Supplementary information follows:

12.1.1 Fabricated and Assembled Items. Items that have been fabricated and/or assembled into essentially their final form and that are customarily cleaned and painted in accordance with the manufacturer's standard practice will be exempted from equivalent surface preparation and painting requirements described herein, provided that: (a) surfaces primed (only) in accordance with such standard practices are compatible with specified field-applied finish coats, (b) surfaces that have been primed and finish painted in accordance with the manufacturer's standard practice are of acceptable color and are capable of being satisfactorily touched up in the field, and (c) items expressly designated herein to be cleaned and painted in a specified manner are not coated in accordance with the manufacturer's standard practice if different from that specified herein.

12.1.2 Colors and Tints. Colors and tints shall match the respective color specimens designated by, or shall otherwise be subject to the approval of, the Chief Engineer. Where specified or directed, alternate applications of successive undercoats having the same color shall be tinted with small amounts of lampblack or other approved ingredients, ground in a vehicle compatible with the paint being tinted, in order to insure that all surfaces are properly coated with the specified number of paint coats. Tinting of vinyl type paints shall be done only by the manufacturer.

12.1.3 Surface Preparation. The method of surface preparation and pretreatment shown in the tabulation of paint systems is for identification purposes only. Cleaning and pretreatment of surfaces prior to painting shall be accomplished in accordance with detailed requirements hereinbefore described.

12.2 Paint Systems and Painting Schedule. See 9A-12.3 below for supplementary application instructions pertaining to the following paint systems:

SYSTEM NO. 4

Items or surfaces to be coated: Swing gates, screw jacks, hinges, miscellaneous metal and all ferrous metal not otherwise specified to be painted, except corrosion resistant steel, galvanized steel and padlocks.

SYSTEM NO. 4

Paint Formulas to be Applied

Surface Preparation	1st Coat	2d Coat	3d Coat	4th Coat	5th Coat
SSPC-SP5 (white metal blast)	White Vinyl V-766e (double spray coat)	Gray Vinyl V-766e (double spray coat)	White Vinyl V-766e (double spray coat)	Gray Vinyl V-766e (double spray coat)	Gray Vinyl V-766e (double spray coat)

NOTE: GRAY VINYL PAINT COLOR APPROXIMATES COLOR CHIP 26231 OF FEDERAL (COLOR) STANDARD 595A AND CHANGE NOTICE 4.

12.2.1 Sixth and seventh coats consisting of a vinyl copolymer paint, Amercoat No. 33 or equal, shall be applied to all surfaces which received the gray vinyl coating. Each coat shall be a blue color approximating color chip 25240 of Federal Standard 595A. The color shall be approved by the Chief Engineer's Representative.

SYSTEM NO. 6

Items or surfaces to be coated are steel sheet piling as shown and detailed on the drawings. Interlock grooves of steel sheet piling will not be coated.

Paint Formulas to be Applied

Surface Preparation	1st Coat	2nd Coat	3rd Coat
SSPC-SP10 (Near white blast)	Coal tar epoxy (black) C-200 or C-200a (Contractor's option)	Coal tar epoxy (black) C-200 or C-200a (Contractor's option)	Coal tar epoxy (black) C-200 or C-200a (Contractor's option) (if needed to attain required thickness)

12.3 Supplementary Application Instructions. Surfaces shall be coated with the system indicated in the schedule and/or as noted on the drawings in accordance with the following instructions:

12.3.1 System No. 4. This vinyl paint system shall be spray applied to an average dry film thickness of at least 7.5 mils for the completed system and the thickness at any point shall be not less than 6.0 mils. The specified total film thickness shall be attained in any event and any additional coats needed to do so shall be applied at no additional cost to the Government. Attainment of the specified film thickness in fewer than the prescribed number of coats or spray passes will be acceptable provided heavier applications do not cause an increase provided that not more than 2.0 mils (dry film thickness) per shall be applied in any event. See safety provisions and special directions for applying vinyl-type paints.

12.3.2 System No. 6. The coal tar epoxy paint shall be applied by brush or spray in not less than two coats to provide a total thickness at any point of not less than 16 mils. The additional (beyond two) coats needed to do so shall be applied at no additional cost to the Board. See safety provisions and special directions for applying coal tar epoxy paint.

13. PROTECTION OF NON-PAINTED ITEMS AND CLEAN-UP. Walls, equipment, fixtures and all other items in the vicinity of the surfaces being painted shall be maintained free of damage by paint or painting activities. Prompt clean-up of any paint spillage and prompt repair of any painting activity damage shall be required.

14. PAYMENT. Payment for all painting work performed and for all materials furnished under the section of the specifications will be included in the contract prices for the items on which the work is performed.

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SECTION 10A - MISCELLANEOUS SPECIALTY ITEMS

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all plant, labor, materials and equipment for miscellaneous specialty items as shown on the drawings and specifications herein and shall include, but is not limited to, the items below.

PART 2 - PRODUCTS

2. MATERIALS.

2.1 Screw Jacks.

2.1.1 Swing Gate. The screw jacks for the swing gate shall have a 12-ton rated capacity with a 1-1/2 by 8-inch malleable base, bell bottom, ball-bearing screw jack as manufactured by Duff-Norton Co., Charlotte, NC (11-1/4 inch closed height and 16-1/4 inch extended height) or equal.

2.2 Turnbuckles and Clevises. Turnbuckles and clevises shall be furnished in the sizes and to the dimensions indicated on the drawings. Turnbuckles and clevises shall be forged, zinc coated steel with U.N.C. threads and shall conform to dimensions and working loads as indicated in the "Manual of Steel Construction", published by the American Institute of Steel Construction".

2.3 Adjustable Shackle Padlocks.

2.3.1 The swing gate shall be supplied with adjustable shackle padlocks keyed alike, Master No. 517KA, as manufactured by Master Padlocks or equal.

2.4 Eye Hook. The eye hook for latching devices shall be 1-1/2 ton (safe working load) as mfg. by Crosby-Laughlin, catalog No. 950-5, Item No. 320A (Alloy Steel), or equal. Eye hook to be "hot dip" galvanized.

2.5 Plastic Sealant. This sealant shall conform to the applicable provisions of Federal Specification SS-S-00210 "Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints".

2.6 Standard Turnbuckles. Standard turnbuckles for latching devices shall be 3/4" x 6", C.R.S., Item No. M-10-ST, by Holloway Louisiana or equal.

2.7 At Transition from I-Wall to T-Wall. The steel sheet piling slip joint shall be surrounded by 18 gage steel sheet metal, as shown on the drawings. The space between the sheet metal and the steel sheet piling is to be filled with a plastic sealant, as specified in 10A-2.5.

2.8 Steel Pipe. ASTM 53-83, "Pipe Steel, Black and Hot Dipped Zinc-coated, Welded and Seamless, Type S, Grade B" Galvanized, Plain Ends.

2.9 Neoprene Gasket. Solid neoprene rubber gasket, soft grade.

2.10 Nordback Epoxy Resin shall be used where indicated on the drawings.

2.11 Sealant shall be Pecora Synthacalk GC-5 (Black) conforming to F.S. TT-S-00227E, Type II as manufactured by Pecora Corporation or equal.

PART 3 - EXECUTION

3. PAYMENT. No separate payment will be made for the material and work covered under this section and all costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.

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SECTION 13A - RAILROAD WORK

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all plant, equipment, labor and materials for removing a section of the Southern Railway Company's track, erecting, maintaining and removing temporary falsework over the excavation for the construction of the swing gate monolith and reconstruction of the track over the completed monolith, all as shown on the plans and as specified herein.

2. AUTHORITY OF RAILROAD ENGINEER: When RAILROAD ENGINEER is referred to in this section, or in any part of the specifications, it shall mean the authorized representative of the Southern Railway Company. The Railroad Engineer, working in conjunction with the Chief Engineer shall have final authority in all questions affecting the safety and maintenance of railroad traffic, and the adequacy of foundations and the structure which will carry the tracks. His approval shall be obtained by the Contractor for methods of construction as well as the time periods when certain portions of the work may be performed with the least interference to railroad traffic. When RAILROAD COMPANY is referred to in this section, or in any part of the specifications, it shall mean the Southern Railway Company.

3. RAILROAD SPECIFICATIONS AND REQUIREMENTS:

3.1 General.

3.1.1 These Provisions are supplementary and amendatory to the Specification and Special Contract Provisions of the Board and where there is conflict herewith, these Special Provisions shall govern.

3.1.2 The Contractor shall comply with all established pertinent regulations and requirements of the Railroad Company and of the Interstate Commerce Commission.

3.1.3 The Contractor shall fully coordinate his work with the Board and with the operations of the Railroad Company.

3.2 Delays. No charge or claim of the Contractor will be allowed for hindrance or delay on account of railroad traffic or any work by others incident to or necessary for the safe operation of railroad traffic or completion of the Contract, but delays for such cause may entitle the Contractor to an extension of time allowed for doing such work, sufficient in the opinion of the Chief Engineer to compensate for the delay, provided immediate notice of the cause of delay is given to the Chief Engineer in writing.

3.3 Storage of Material. Material and equipment shall not be stored where they will interfere with railroad traffic nor on the right-of-way of the Railroad Company without first having obtained written permission of the

Railroad Engineer, and any such permission will be with the understanding that the Railroad Company will not be liable for damage to materials and equipment from any cause and that the Railroad Engineer may move at the Contractor's expense, or have the Contractor move, materials and/or equipment from such storage locations.

3.4 Clearances. The Contractor must maintain above top of rail a side clearance of not less than 15 feet from center of track and an overhead clearance of not less than 22 feet, or if interference or placement of obstructions within the specific clearances are necessary the Contractor shall not proceed without specific authority and approval of the Railroad Engineer. The Contractor shall at all times during the period of period of construction, keep the railroad tracks and roadbed free of materials, earth, mud and other debris.

3.5 Interference with Train Service. The Contractor shall so arrange his work that there will be no interference with, or delay to, the train service of the Railroad Company or interference with the signal and communications lines adjacent to the tracks. Whenever the work is liable to affect the movement or safety of trains the method of doing such work shall be submitted to the Railroad Engineer for approval. During the progress of the work, the Contractor shall maintain liaison with such of the Railroad Company's officers and representatives as may be designated by the Railroad Company so as to ascertain the time of passage of trains at the site of the work, and to clear the railroad facilities and tracks of men, equipment and obstructions to permit free flow of railroad traffic.

3.6 Flagging Protection or Watchmen.

3.6.1 The Railroad Company will furnish such watchmen or flagging services as outlined below during construction, all cost of which is to be reimbursed by the Contractor. The Contractor shall give not less than 72 hours notice of the need for such services and no work requiring such service shall be accomplished without the accompanying service.

3.6.2 Watchmen or flagging services consisting of one (1) watchman or flagman will be required at all times during construction when the Contractor is working within fifty (50') feet each side of the Railroad Company's main track.

3.7 Notification of Starting Work. The Contractor shall notify the Chief Engineer and the Railroad Engineer at least 10 days before starting work upon the right-of-way of the Railroad Company. No work shall be undertaken until the Contractor has secured written permission from an authorized representative of the Railroad Company to enter onto railroad right-of-way. Approval to begin work will not be granted until the Railroad Protective Insurance requirements in the Supplementary Specifications have been satisfied. The Contractor shall confer with officials of the Railroad Company relative to requirements for clearances, operation and general safety regulations.

3.8 Excavation. Excavation under and adjacent to the Railroad Company's tracks shall be done with such care and in such a manner that Railroad facilities will not be damaged by the Contractor's equipment, or by earth movements. Sheet pile retaining walls adjacent to the railroad tracks and the tracks shall be monitored for movement until backfill is placed behind the new floodwalls.

3.9 Interruptions. The Contractor will not be allowed any claim for compensation because of interruptions to, or changes in his method of work which are necessary to prevent or remove hazards to continuous railroad operations.

3.10 Blasting. No blasting will be permitted.

4. SUBMITTALS: The Contractor shall prepare and submit complete shop drawings showing temporary falsework details for the approval of the Chief Engineer and the Railroad Engineer. He shall also submit for approval a schedule and sequence of operations covering all phases of both temporary and permanent construction for the swing gate monolith. Submittal of shop drawings will also be required for the pipe sleeves installed through the railroad embankment under Section 14 - Sewers, Pipelines and Ducts.

PART 2 - PRODUCTS

5. MATERIALS:

5.1 Structural Steel. All steel shapes and plates in the temporary falsework shall be new, or used material in good condition, meeting the requirements of ASTM-A36. Mill test reports will not be required.

5.2 Hardware. All hardware in the temporary falsework shall have the minimum diameter and length shown on the plans and shall be new or used material in good condition.

5.3 Timber. All bridge ties and guard rails, will be furnished by the Southern Railroad Company. The Contractor shall furnish a Bill of Timber Material to the Railroad Engineer. Walkway materials including railing posts, hand rails and walk plank shall be furnished by Contractor.

5.4 Track. All track and track hardware will be furnished and installed by the Southern Railway Company.

5.5 Steel Pipe Piles. Pipe piles shall have the length and minimum wall thicknesses specified on the drawings and shall be new or used material in good condition with no damage or loss of wall thickness due to corrosion.

5.6 Ballast. Ballast for backfill under the track and for roadbed reconstruction over the completed swing gate monolith shall conform to the AREA Specifications for Prepared Stone, Slag and Gravel Ballast, AREA No. 4.

PART 3 - EXECUTION

6. WORK TO BE DONE BY THE SOUTHERN RAILWAY COMPANY:

6.1 The Railroad Company will do the following work:

6.1.1 Provide flagging and watchmen services as required at the Contractor's expense.

6.1.2 Cut out and remove a section of existing rail and cross ties in the vicinity of the swing gate.

6.1.3 Install rail on the temporary falsework and bolt to existing rail on each side of the opening.

6.1.4 Install rail and cross ties over complete swing gate monolith.

6.1.5 Furnish timber materials listed under Section 13.5.3.

7. WORK TO BE DONE BY THE CONTRACTOR:

7.1 The Contractor shall perform all work which is necessary for the fabrication, installation, maintenance and removal of the temporary falsework in accordance with details shown on the plans and covered in these specifications unless an item of work is described herein as being performed by the Railroad.

7.2 The Contractor shall provide, at no expense to the Railroad Company cranes and other construction equipment as required to assist the Railroad Company in performing the track work necessitated by the construction of the swing gate.

8. SEQUENCE FOR TEMPORARY FALSEWORK:

8.1 The Contractor shall completely prefabricate the temporary falsework bridge and caps for the pipe piles and shall have this material and the pipe piles on hand before starting to drive the piling for the temporary falsework.

8.2 Existing cross ties which remain in the roadbed after the track is removed by the Railroad shall be salvaged by the Contractor for reuse when the track is relaid over the completed monolith. Ties which are deemed not suitable for reuse by the Railroad shall become the property of the Contractor and shall be removed from the site.

8.3 The Contractor shall be responsible for removing the temporary falsework, when necessary for the performance of other work on this contract, and shall also be responsible for reinstalling the falsework and rebolting the rails at the completion of each removal period.

8.4 Timber members for the temporary falsework which are furnished by the railroad shall be fitted and installed by the Contractor in accordance with details shown on the plans. The plank walkway and handrail shall transition smoothly at each end of the falsework.

9. MEASUREMENT:

9.1 All materials, equipment, labor, tools, etc., required for the performance of work included under this section, unless measured for payment under other items of work in this Contract shall be measured for payment as a lump sum unit.

9.2 Ballast backfill which is under the roadbed at the swing gate monolith is considered incidental to the work described herein and will not be measured separately for payment.

9.3 The sheet pile retaining wall which is parallel to the railroad tracks and the sheet pile retaining walls at each end of the temporary falsework for the swing gate are measured for payment under Section 5 - Steel Sheet Piling. All excavation for the monoliths and all monolith construction are measured for payment under other sections of the Specifications.

10. PAYMENT: Payment for Railroad Work will be made at the contract lump sum price, which price shall be full compensation for all Railroad Work indicated on the plans and/or described herein.

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SECTION 13B - RELIEF WELL SYSTEM

PART 1 - GENERAL

1.0 SCOPE. The work provided for herein consists of furnishing all plant, labor, material and equipment and construction, developing, and testing of relief wells as indicated on the drawings and as specified herein.

2.0 RELATED WORK SPECIFIED ELSEWHERE.

2.1 Structural Site Cast Concrete. Section 3D

2.2 Reinforcing Steel. Section 3B

2.3 Formwork for Concrete. Section 3A

3.0 QUALITY CONTROL.

3.1 General. The Contractor shall establish and maintain quality control for relief well operations to assure compliance with contract specifications and maintain records of his quality control for all construction operations including but not limited for the following:

3.1.1 Construction operations as to accuracy and compliance.

3.1.2 Drilling depth, alignment.

3.1.3 Placing screen and riser pipe as to depth and vertical alignment.

3.1.4 Gravel filter and concrete backfill placement.

3.1.5 Development of wells.

3.1.6 Pumping tests.

3.2 Reporting. One original and two copies of these records and tests, as well as the corrective action taken, shall be furnished the Chief Engineer daily. Format of the report shall be as prescribed in Special Clauses.

3.3 Material Tests. The Contractor shall have required material tests performed by an approved laboratory to demonstrate that the materials are in conformance with the specifications. The Contractor shall employ an approved testing lab capable of logging the well hole for determining the well penetration depths. Tests shall be at the Contractor's expense.

4.0 RELIEF WELLS.

4.1 The location of the relief wells shall be as shown on the drawings. The location may be varied in the field by the Chief Engineer as may become

necessary due to obstruction. The wells shall be installed and operative a distance of two well spacings ahead of the concrete I-wall construction.

4.2 The depth of the well indicated on the drawing is approximate only. The exact depth of each well will be measured from the bottom of the sand aquifer as determined in the field. The exact depth of a well may be varied in the field by the Chief Engineer if obstructions are encountered or if impervious strata are found where the screen sections are to be installed.

4.3 Obstructions Encountered. If buried logs or other obstructions are encountered in the foundation which are such as to render it impracticable to advance the drill hole to the design depth, the Chief Engineer may adjust the depth, in order to utilize the well in the final system at the depth actually obtained or he may direct the Contractor to abandon and plug the hole as prescribed in paragraph 3.10.1, and construct another well at an adjacent location. Where obstructions are encountered, drilling shall be continued until it is demonstrated that further efforts to advance the drill hole are impracticable. Holes which are abandoned because of impracticability of completion to the desired depth will be paid for as specified in paragraphs 5.3 and 6.3, except that payment will not be made for any holes the abandonment of which is necessitated by faulty operation or neglect of the Contractor.

4.4 Materials.

4.4.1 Well Screen.

4.4.1.1 General. The well screen shall be installed for each well as indicated on the drawings and shall be slotted PVC (stave) pipe conforming to ASTM D 3034 of the type and dimensions indicated on the drawings, and as hereinafter specified. The inside diameter of the screen shall be not less than 8 inches and the wall thickness not less than schedule 40. Screen openings shall be uniform in size and pattern, and shall be spaced approximately equally around the circumference of the pipe, except that the spacing of the slots may be varied slightly, if necessary, to permit the openings to be formed diametrically in one operation. The well pipe screen shall have 0.05-inch slots with sufficient slot area to provide an entrance velocity of 0.1 feet per second for the maximum anticipated discharge (46 GPM).

4.4.1.2 Bottom Plug for Well Screen. The bottom plug for each well screen shall be made of the same material as the screen.

4.4.2 Riser Pipe. The riser pipe shall be installed for each relief well as indicated on the drawings and shall be PVC pipe of the type and dimensions shown on the drawings, and shall comply in every respect with the requirements specified in paragraph 3.4.1.2 for the well screen except that the screen openings shall be omitted.

4.4.3 Miscellaneous Material.

4.4.3.1 Corrugated Metal Pipe. The bituminous coated corrugated metal pipe for relief well outlets and manholes shall be installed for each relief well and shall conform to Fed. Spec. WW-P-00405 for "Pipe, Corrugated (Iron or Steel, Zinc Coated)", Class 1, Shape 1, Type A.

4.4.3.2 Manhole Cover Plates. Manhole covers shall be installed for each relief well as indicated on the drawings. Manhole covers shall be made of structural steel meeting requirements of Federal Specification QQ-S-741b for "Steel, Carbon, Structural Shapes, Plates and Bars," for Type I or ASTM A7-61T for "Steel for Bridges and Buildings," and shall be galvanized after fabrication.

4.4.3.3 Coupling Bands. Coupling bands shall be of the same material as the pipe and shall be similarly coated. The bands shall be one-piece and shall be a minimum of 7 inches wide. The bands shall be so constructed as to lap on an equal portion of each of the pipe sections to be connected and shall be connected at the ends by zinc-coated angles having minimum dimensions of 2 inches by 2 inches by 3/16 inch and adequately fastened to the bands. The bands shall have at least two zinc-coated bolts not less than 1/2 inch in diameter.

4.4.3.4 Outlet Pipe Guard Screens. Outlet pipe guard screens shall be installed for each relief well as indicated on the drawings. Steel for the outlet pipe guard screens shall be as specified in paragraph 3.4.3.2 and shall be galvanized after fabrication.

4.4.3.5 Check Valves. Check valves shall be installed for each relief well and fabricated as shown on the drawings. Brass for check valves shall meet the requirements of Fed. Spec. QQ-B-626c for "Brass, Leaded and Non-Leaded Rods, Bars, Shapes, Forgings, and Flat Products With Finished Edges, (Bar and Strip)," Composition D, half-hard.

4.4.3.6 Anchor Bolts and Gaskets. Anchor bolts, nuts, rubber gaskets and other materials not otherwise shown or specified shall be commercial quality products suitable for the proposed use.

4.4.3.7 Welding. All welding shall be in accordance with approved methods, such that welded joints will be as strong as the base metal. After completion of such welding, all welds and adjoining surfaces shall be wire brushed, painted with at least two coats of zinc dust-zinc oxide primer conforming to Fed. Spec. TT-P-00641e, Type III, and bituminous coated.

4.4.4 Gravel Filter. Material for the gravel filter shall be placed around each well screen and riser pipe as shown on the drawings and shall be washed gravel composed of hard, tough and durable particles free from adherent coatings. It shall contain no vegetable matter nor soft, friable thin or

elongated particles in quantities considered deleterious by the Chief Engineer and shall meet the following gradation requirements:

GRAVEL

Sieve Designation U.S. Std. Square Mesh	Percentage by Weight Passing
3/8 inch	84-100
No. 4	64-90
No. 8	45-78
No. 20	35-18
No. 50	5-0
No. 200	0

4.4.5 Outlets. Permanent outlets for relief wells shall consist of those indicated on the drawings. The tops of the risers of wells shall be sealed immediately after completion of the installation with a watertight seal which shall be kept in place at all times except during cleaning and pumping operations, until the well is connected to the permanent outlet.

4.5 Drilling.

4.5.1 Relief Well Installation. The relief wells should be installed with reverse circulation rotary methods. These procedures minimize the amount of cuttings as the hole is advanced and provides the stability of the hole by maintaining an excess hydrostatic pressure. Therefore, it is required that the piezometric heads in the foundation strata be below the existing ground surface elevation in order to facilitate the reverse circulation installation. Piezometric data accumulated at the project site indicates that the existing piezometric heads within the foundation sand strata are below the ground surface elevation during normal conditions. Note: These heads are subject to fluctuation with tide and that periodic high heads should be anticipated. Piezometric data should be accumulated by the Contractor (using existing piezometric wells at the site) and provided to the well installation contractor. Reverse circulation methods should not be employed if the piezometric head in the foundation sand strata is above the existing ground surface.

4.5.2 Well Hole. The well hole should be logged and screen placed so that it fully penetrates the foundation sand strata. The estimated range of elevations for the screen is shown on Figure 2. Generally, it is anticipated that the screen length will be approximately 30 feet.

4.6 Installation of Screen and Riser.

4.6.1 Assembly. All screen and riser pipe shall be in good condition before installation and all joints and accessory parts shall be securely fastened in place. The successive lengths of screen and pipe shall be

arranged to provide accurate placement of the screen sections in the previous strata. The Contractor shall use the longer lengths of screen and riser pipe whenever practicable. Unlimited use of shorter lengths will not be permitted. Particular care shall be taken to avoid damaging the screen and riser pipe during installation and throughout all subsequent operations. The screen and riser shall be centered in the hole and held securely in place during placement of the filter by means of spiders, an approved centering guide and tremie holder, or other approved method. Prior to the installation of any screen and riser pipe, the Contractor shall submit to the Chief Engineer for approval full details of the method, equipment, and devices he proposes to use for centering and holding the screen and riser pipe in the well hole.

4.6.2 Installation. The assembled screen and riser pipe shall be placed in the well hole in such manner as to avoid jarring impacts and to insure that the assembly is not damaged or misplaced. The top of the riser pipe shall be held at the designated elevation during placement of filter. Immediately after the installation of the well screen and riser pipe, the depth to the bottom of the screen shall be measured by means of an approved rod.

4.6.3 Alignment. Each completed well shall be sufficiently straight and plumb, that a 6-inch-diameter cylinder 10 feet in length may be lowered for the full depth of the well and withdrawn without binding against the sides of the pipe. A variation of 6 inches will be permitted in the alignment of the combined screen and riser pipe from a plumb line at the top of the well. However, this will not relieve the Contractor of the responsibility of maintaining adequate clearance for installation of bailing, surging, and pumping equipment required for developing and testing the well.

4.7 Placement of Gravel Filter. After the screen and riser pipe have been placed, the filter gravel shall be placed through a tremie containing approximately 1/16-inch-wide slotted wall openings, and extending to the bottom of the hole. The filter material shall be placed in an approved manner and without significant segregation. The filter shall have a minimum thickness of not less than 6 inches between the outside of the wall screen and the outside of the filter and shall be placed to the elevation shown on the drawings or as directed. At commencement of the placement operation, the tremie shall rest on the bottom of the hole and it shall be filled with the filter material. At all times during the placing of the filter gravel, the tremie shall be kept filled with gravel to within 5 feet of its top. The tremie and the temporary casing, if used, shall then be raised in increments not to exceed 2 feet, allowing the gravel to flow out the bottom of the tremie as more gravel is placed in the top. The tremie and casing shall be raised in increments approximately equal to the increments of filter placed, except that at no time prior to the completion of placement of the filter shall the bottom of the casing be less than one foot below the top of the filter gravel in the hole. the alternate placing of filter gravel and withdrawing of tremie and temporary casing shall be continued until the filter gravel has been placed to the required elevation.

4.8 Development of Relief Wells. Within 4 hours after completion of the placing of the gravel filter, material which may have entered the well screen and riser pipe shall be removed and the development of the well commenced. The development of the well shall consist of surging and pumping so as to achieve a stable well of maximum efficiency. The method and amount of surging and pumping required to develop each well shall be as approved by the Chief Engineer. The surging and removal of material pulled into the well by such surging shall be accomplished in cycles of not less than 1-1/2 hours, and shall be continued until the amount of material pulled through the screen during a surging cycle does not exceed a depth of 0.2 foot in the well. After the well has been surged, it shall be pumped until all fines and drilling mud are removed from the well. Such pumping shall begin within 3 hours after surging and shall continue for not less than 20 minutes. The well shall be pumped so as to achieve a drawdown of 10 feet or a flow of approximately 30 gallons per minute, whichever is achieved first. The Contractor shall obtain and furnish to the representative of the Chief Engineer for recording the elevation of the water surface in each well at the beginning and at the end of the development pumping, the flow in gpm at the completion of the pumping and the time of each observation. These data shall be obtained immediately before starting the pump and immediately before stopping the pump upon completion of the development pumping. If at the completion of pumping, the well is producing sand at a rate in excess of approximately two pints of sand per hour, as determined from soundings in the well and collection of samples in a ten-gallon container, the well shall be resurged and pumped again. Alternate surging and pumping shall be continued until material entering the well during either surging or pumping is less than the amount specified above, but for a period of not longer than 6 hours. Wells which continue to produce an excessive amount of sand or filter material during development shall be abandoned as directed by the Chief Engineer except that the Contractor, if he so elects, may continue to develop such wells by approved methods, which will not decrease the effective screen area of the well, at his own expense. If, after such further development, a well meets the above stated requirements, it shall be completed and after successful completion of the required pumping test, will be accepted as satisfactory. If, after completion of all surging and pumping, there is more than 0.5 feet of material in the bottom of the well, such material shall be removed with a piston-type bailer or by pumping. Immediately upon completion of the development of the well, the top of the riser pipe shall be sealed in accordance with para. 3.4.5 of this section. The water resulting from pumping of the wells shall be discharged outside the working area at locations approved by the Chief Engineer.

4.9 Backfilling. After a well has been satisfactorily developed by surging, the annular space at each well above the gravel filter shall be backfilled with concrete as indicated on the drawings. Concrete for backfill shall conform to the applicable provisions of Section 3 and shall be placed by tremie in an approved manner so that segregation and voids are held to a minimum. Temporary casing, if used, shall be withdrawn as backfill is placed so that its bottom is at all times near the top of the placed backfill.

4.10 Abandoned Wells.

4.10.1 Well holes abandoned prior to the placement of well screen and riser pipe shall be completely filled to within 3 feet of the ground surface with a thick slurry consisting of 1 part Bentonite and 3 parts Portland cement. The upper 3 feet of the hole shall be filled with earth.

4.10.2 Wells abandoned after placement of well screen riser shall be filled as described above except that the riser pipe shall be removed prior to filling the hole with the slurry.

4.11 Pumping Tests. Upon completion of a well installation, surging and development pumping, and before final acceptance, each well shall be subjected to a pumping test. The test pumping and sand infiltration tests hereinafter specified may, at the option of the Contractor, be performed either before or after placement of the concrete backfill prescribed in para. 3.9 of this section. Prior to commencement of the pumping test and again after completion of the pumping test, the depth of the well shall be measured under the direction of the Chief Engineer, by means of an approved sounding rod. the Contractor shall provide an approved means for accurately determining the water level in the well during all conditions. The Contractor shall furnish and install a calibrated flow meter of standard design for the purpose of measuring the discharge from the well during the pumping test. The Contractor shall also furnish an approved large suitably baffled tank of not less than 1,000-gallon capacity, into which the well discharge shall be pumped for the purpose of determining whether sand and/or other material is being pumped out of the well. The Contractor shall provide a pump capable of producing the specified drawdown over a period of time sufficient to satisfactorily perform the pumping test specified. The use of deep well pumps will be permitted provided that the pump itself is kept within the riser pipe, and the Contractor demonstrates to the satisfaction of the Chief Engineer that all specified requirements of pumping and sand measurement can be complied with. The pump shall be complete with either gasoline, diesel, or electric motor of adequate size. In case an electric motor is used, the Contractor shall provide, without additional cost to the Board, the electric power and the necessary wiring which he will remove at the completion of the pumping test. The pumping and sand infiltration tests will be conducted under the direction of the Chief Engineer. The following test data shall be obtained by the Contractor, with items a. through e. to be recorded by the Contractor and items f. through g. recorded by the Chief Engineer:

- a. Time of observation
- b. Depth of water in well before, during, and after pumping
- c. Flow in gallons per minute
- d. Elevation of water in well before and after pumping
- e. Elevation of water in adjacent wells or piezometers before and during pumping when requested by the Chief Engineer
- f. The depth of sand in well before and after pumping

g. Amount of sand pumped out of well and collected in tanks

All pump units shall be installed in the wells in such a manner that the depth to the water surface in the well can be determined while the pumps are operating.

The Contractor shall test each well by pumping continuously for a minimum of 4 hours. The pumping shall be at a constant rate sufficient to produce either a drawdown of 10 feet in the well or a production of 30-35 gpm. No test pumping will be permitted concurrently with drilling, surging or pumping of any other well within 400 feet thereof. In the event that sand or other material infiltrates into the well as a result of the pumping test, the following procedure will be followed: If the rate of sand infiltration during the last one-half hour of the pumping test is more than one half pint per hour, the well shall be resurged by manipulation of the pump for 20 minutes after which the test pumping shall be resumed and shall be continued at the constant rate specified above until the sand infiltration rate is reduced to less than one-half pint per hour for two consecutive 15-minute test periods but not for more than a total of 8 hours. If, at the end of 8 hours, pumping the rate of infiltration of sand is more than one-half pint per hour, the well shall be abandoned, except that the Contractor, if he so elects, may continue the test pumping and perform such other approved remedial work as he considers desirable. If, after such additional test pumping and other remedial measures the sand infiltration rate of a well is reduced to not more than one-half pint per hour for two consecutive 15-minute test periods, the well will be accepted. Upon completion of the pumping test, any sand or filter material in the bottom of the well shall be removed by pumping or with a piston type bailer.

4.12 Concrete Paving. Preparation of foundation to receive concrete paving shall be in accordance with applicable provisions of Section 3. Paving shall be placed as shown on drawings for relief wells.

5.0 MEASUREMENT.

5.1 Relief Wells. Relief wells will be measured for payment by the linear foot of completed well based on the length of well screen and riser pipe installed. Completed wells ordered abandoned by the Chief Engineer due to no fault or negligence of the Contractor, will be measured for payment on the same basis as completed wells.

5.2 Plugging Wells. The plugging of completed wells ordered abandoned by the Chief Engineer, due to no fault or negligence of the Contractor, will be measured for payment by the linear foot of well plugged as required. The plugging of wells abandoned due to fault or negligence of the Contractor will not be measured for payment.

5.3 Plugging Holes. The plugging of holes ordered abandoned by the Chief Engineer, due to no fault or negligence of the Contractor, will be measured

for payment by the linear foot of hole drilled and plugged as required. The plugging of holes abandoned due to fault or negligence of the Contractor will not be measured for payment.

5.4 Pumping Tests. The test pumping of relief wells will be measured for payment for the first 4 hours of test pumping as a unit for the 4-hour period and for additional pumping by the hour, measured to the nearest 15 minutes, of test pumping successfully performed as required. The time required to place and remove testing and pumping equipment will not be measured for payment.

5.5 Corrugated Metal Pipe. Corrugated metal pipe will be measured by the linear foot for each size of pipe installed.

5.6 Manhole Covers. Manhole covers will be measured for payment by the cover in place.

5.7 Outlet Pipe Guard Screens. Outlet pipe guard screens will be measured for payment by the guard screen in place.

5.8 Relief Well Check Valves. Relief well check valves will be measured for payment by the check valve in place.

5.9 Concrete Paving. Concrete paving shall be measured for payment by the number of squares (100 sq. ft.) in place.

6.0 PAYMENT.

6.1 Relief Wells. Payments for relief wells will be made at the applicable contract unit prices for "Relief Well Screen," and "Relief Well Riser," which prices and payments shall constitute full compensation for furnishing all plant, labor, material and equipment and constructing the wells, including the gravel filter, concrete backfill, surging and pumping and all operations incidental to constructing and developing the relief wells except pumping tests, check valves and outlets which are specified to be paid separately.

6.2 Plugging Abandoned Relief Wells. Payment for plugging completed wells ordered abandoned will be made at the contract unit price for "Plugging Abandoned Relief Wells," which price and payment shall constitute full compensation for furnishing all plant, labor, materials, and equipment and performing all operations required to plug the wells. No payment will be made for the plugging abandoned wells due to fault or negligence of the Contractor and all costs incidental thereto shall be borne by the Contractor.

6.3 Plugging Abandoned Holes. Payment for drilling and plugging holes ordered abandoned will be made at the contract unit price for "Plugging Abandoned Holes," which price and payment shall constitute full compensation for furnishing all plant, labor, material and equipment and all operations required to drill and plug holes. No payment will be made for the plugging of holes abandoned due to fault or negligence of the Contractor and all costs incidental thereto shall be borne by the Contractor.

6.4 Pumping Tests. Payments for test pumping will be made at the applicable unit prices for "Relief Well, Pumping Test, 4 Hours" and "Relief Well, Additional Pumping." The contract price for "Relief Well, Pumping Test, 4 Hours" shall constitute full compensation for furnishing all plant, labor, material and equipment, installing and removing pumping and testing equipment and for all other operations required for conducting the test pumping for a 4-hour period of required test pumping. The contract unit price per hour for "Relief Well, Additional Pumping," shall constitute full compensation for all costs of performing pumping in excess of the specified 4-hour period.

6.5 Corrugated Metal Pipe. Payment for corrugated metal pipe will be made at the applicable unit price for each size of pipe, "24" Dia. Galv. CMP. Coated and "12" Dia. Galv. CMP Coated," which prices and payments will constitute full compensation for furnishing all plant, labor, material and equipment for installing the pipe, including all pipe connections, elbows, tees, and eccentric reducers.

6.6 Manhole Covers. Payment for manhole covers will be made at the contract unit price for "Manhole Covers," which price and payment shall constitute full compensation for furnishing all plant, labor, material and equipment and furnishing and installing the manhole covers as required.

6.7 Outlet Pipe Guard Screens. Payment for guard screens will be made at the contract unit price for "Outlet Pipe Guard Screen," which price and payment shall constitute full compensation for furnishing all plant, labor, material, and equipment and installing the guard screens as required.

6.8 Relief Well Check Valves. Payment for check valves will be made at the contract unit price for "Relief Well Check Valves," which price and payment shall constitute full compensation for furnishing all plant, labor, material, and equipment and installing the check valves as required.

6.9 Concrete Paving. Payment for concrete paving will be made at the contract unit price for "Concrete Paving," which price and payment will constitute full compensation for furnishing all plant, equipment, material and labor, and all costs incident thereto.

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(NOT USED)

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SECTION 15A - MODIFICATIONS TO EXISTING UTILITIES

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SECTION 15A - MODIFICATIONS TO EXISTING UTILITIES

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all plant, equipment, labor and materials and performing all operations in connection with the removal of sections of existing pipelines to permit floodwall construction and the restoration of these lines to service in accordance with details shown on the plans.

The work also includes furnishing and installing water mains, water service connections, sewer mains and sewer service connections, pipe thimbles through the floodwall, and concrete encasements and other work shown on the plans or required by the specifications as a part of these items. All work shall conform to the requirements of the Sewerage and Water Board of New Orleans General Specifications Sections B to F, as modified and supplemented herein. Said sections of the Sewerage and Water Board Specifications are contained in Appendix A. The Contractor shall be fully responsible for determining the conditions which he will encounter in the performance of this work and shall make all provisions necessary for performing the work in an expeditious and safe manner.

2. RELATED WORK SPECIFIED ELSEWHERE

2.1 Structural Excavation and Fill - Section 2E.

2.2 Incidental Paving - Section 2H.

2.3 Formwork for Concrete - Section 3A.

2.4 Reinforcing Steel - Section 3B.

2.5 Structural Sitecast Concrete - Section 3D.

2.6 Sewerage and Water Board General and Special Specifications - Appendix A.

3. APPLICABLE PUBLICATIONS. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

3.1 Federal Specifications (Fed. Spec.):

SS-S210	Sealing, Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.
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3.2 American Society for Testing and Materials (ASTM)
Publications:

A 36	Structural Steel
A 53	Pipe, Steel, Black & Hot-Dipped, Zinc-Coated Welded and Seamless
A307	Carbon steel Externally Threaded Standards Fasteners
C 76	Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
C 91	Masonry Cement
C 144	Aggregate for Masonry Mortar
C 150	Portland Cement
C 216	Facing Brick (Solid Masonry Units Made From Clay or Stone)
C 443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
C 478	Precast Reinforced Concrete Manhole Sections

4. QUALITY CONTROL.

4.1 General. The Contractor shall establish and maintain quality control for the storm drainage construction operations to assure compliance with contract specifications and maintain records of his quality control for all construction operations including but not limited to the following:

(1) checking construction operations and certifying compliance with applicable sections of the specifications,

(2) checking operations including concrete work, welding, masonry and earth work and certifying with applicable sections of the specifications,

(3) checking materials, including plastic sealant, pipe, pipe sleeve assembly, manhole, materials, gate valves, and transitional fittings. The Contractor is to certify that all materials are in compliance with applicable regulations.

4.2 Reporting. The original and two copies of these records of test, as well as the records of corrective action taken, shall be furnished the Board daily. Format of report shall be as prescribed in Special Clauses.

5. DELIVERY, STORAGE AND HANDLING OF MATERIALS.

5.1 Delivery and Storage. Materials delivered to site shall be inspected for damage, unloaded, and stored with the minimum of handling. Do not store material directly on the ground. Inside of pipes and fitting shall be kept free of dirt and debris.

5.2 Handling. Materials shall be handled in such a manner as to insure delivery to the trench in sound undamaged condition. Pipe shall be carried to the trench not dragged. Gasket materials and plastic materials that are not to be installed immediately shall not be stored in the direct sunlight.

5.3 Movement of Construction Machinery. In compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a pipe at any stage of the construction shall be at the Contractor's risk. Any pipe damaged thereby shall be repaired or replaced at the expense of the Contractor.

6. COORDINATION. Prior to making any utility tie-ins the Contractor shall notify the S&WB at 945-4183 and the Fire Alarm Dept. (488-0811) 15 days in advance of interruption of service.

7. SUBMITTALS.

7.1 Manufacturers recommendations. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of the recommendations shall be furnished to the Chief Engineer prior to installation. Installation of the item will not be allowed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

7.2 Pipe. Certified copies of test reports demonstrating conformance to applicable pipe specifications shall be delivered to the Chief Engineer before pipe is installed.

7.3 Shop Drawings. The Contractor shall prepare and submit, for the approval of the Chief Engineer, shop drawings and descriptive literature showing complete details of the pipe, other metal work and hardware. The Contractor shall be responsible for the correctness of the drawings and for the fit of the new pipe sections and appurtenances to the existing pipes.

7.4 Work Schedule. The Contractor shall prepare and submit a detailed schedule of work for each of the following pipelines crossing the floodwall:

1. 12-inch Water Main at Sta. 1 + 85
2. 16-inch Water Main at Sta. 6 + 20

The schedule shall show the Contractor's timetable for completing the required work on and under each pipeline within a 24-hour period. The schedule shall also show the work which will be performed in advance of and subsequent to the 24-hour shutdown. Only one pipe may be taken out of service at a time. When preparing this schedule, the Contractor shall contact the Sewerage and Water Board one week in advance regarding the days when outages will be permitted.

PART 2 - PRODUCTS

8. MATERIALS. All materials shall comply with the requirements of the Sewerage and Water Board General Specifications - Section C - Materials and Section S-1 of the Sewerage and Water Board Special Specifications (Appendix A) and the following requirements.

8.1 Steel Pipe Sleeves. Steel pipe sleeves for utility modifications shall meet requirements of specifications for "Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless steel Pipe," ASTM Designation A 53, Type S, Grade B, and shall be of the shapes and sizes shown on the drawings.

8.2 Neoprene Rubber Sleeve and Stainless Steel Bands and Clamps. Neoprene rubber sleeve type casing seal with stainless steel bands and clamps as manufactured by Pipeline Seal and Insulator Co. Model "C" or approved equal.

8.3 Plastic Sealant. This sealant shall conform to the applicable provisions of Federal Specification SS-S-00210.

8.4 Reinforced Concrete Pipe. Reinforced concrete pipe for drains shall conform to the latest current ASTM C 76, Class II.

8.5 Pipe Joints.

8.5.1 All storm drain pipe shall be of the Rubber Gasketed Bell and Spigot Type, so designed as to provide for self-centering and, when assembled, to compress the gasket to form a watertight seal.

8.5.2 The gasket shall be a continuous ring made of rubber of such size and cross section as to substantially fill the spigot recess. The physical requirements for the rubber-type gaskets shall conform to ASTM C 443.

8.5.3 Installation of gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; and loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint, the gasket or jointing material becomes loose and can be seen through the exterior joint recess when joint is pulled up to within one inch of closure, the pipe shall be removed and the joint remade.

8.6 Shell. The shell backfill shall consist of live or dead clam, reef shell, or cannery shell and shall be free of objectionable matter such as sticks, mud, clay, lumps, or other foreign matter, except that foreign matter, such as clay and sand, will be permitted in an amount not exceeding 10 percent by weight when dry, providing such material is dispersed uniformly throughout the mass.

8.7 Manholes. All material shall comply with the requirements of Sections C, D, & E. of the S&WB General Specifications.

8.8 Thrust Block Concrete. All concrete in thrust blocks shall comply with the requirements of Section 3 for Concrete ($f'c = 2,000$ psi).

8.9 Sewer Force Mains and Water Mains. Sewer force mains and water mains shall be in accordance with Section S-1 "Pipe" of the Sewerage and Water Board Special Specifications and the General Specifications Sections B through F (Appendix A).

PART 3 - EXECUTION

9. FABRICATION.

9.1 All pipe and other metalwork fabrication, welding, and machine work shall comply with the applicable provisions of Section 9 - Metalwork Fabrication, Machine Work and Miscellaneous Provisions and the Sewerage and Water Board General and Special Specifications. The replacement sections of 12-inch and 16-inch water mains shall be completely fabricated and delivered to the project site, together with all required hardware, gaskets and miscellaneous parts, before any of these pipes will be shut down to permit work by the Contractor. The interior lining shall be complete except on the ends of the pipe adjacent to the field welded joints. Failure to have all necessary parts on hand will necessitate rescheduling the shutdown with the Sewerage and Water Board.

9.2 Installation of Pipe Sleeves. The Contractor shall cut the sheet piling and seal weld a steel sleeve to the piling and make such other modifications as shown on the drawings. After this work has been inspected and approved by the Chief Engineer the Contractor shall reconnect a new portion of waterline pipe to match the existing as shown. The Contractor shall pack the sleeve or slip the removed portion of pipe to the existing pipe. The Contractor shall pack the sleeve or slip joint around the pipe with plastic sealant in such way as to completely fill the sleeve or slip joint and leave no voids or air pockets. Neoprene rubber sleeve type casing seals shall be installed in accordance with the manufacturers recommendations and held in place with stainless steel bands and clamps as shown on the drawings. The Contractor shall pack the sleeve or slip the removed portion of pipe to the existing pipe. The Contractor shall pack the sleeve or slip joint around the pipe with plastic sealant in such way as to completely fill the sleeve or slip joint and leave no voids or air pockets. Neoprene rubber sleeve type casing seals shall be installed in accordance with the manufacturers recommendations and held in place with stainless steel bands and clamps as shown on the drawings. The Contractor shall provide any additional lengths of pipe that may be required to complete the utility modifications.

9.3 Pipe Joints. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, and adhesives shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted so as to obtain a watertight fit.

9.4 Excavation and Backfill. All excavations and backfill shall be in accordance with Sewerage and Water Board General and Special Specification except as modified by details shown on the plans.

9.5 Construction Details. All work shall comply with the requirements of the Sewerage and Water Board General and Special Specifications unless modified by these plans and these specifications.

9.6 12-inch and 16-inch Water Mains. The removal, replacement and restoration to service of each section of pipeline shall be carried out in conformance with the requirements of these specifications and as shown on the plans, or as otherwise directed by the Chief Engineer. Safe construction and installation practices meeting the requirements of applicable codes and local requirements shall be maintained.

9.7 Pipe Sleeve for Gas Main. Installation of the thimble for the gas main through the sheet pile cutoff wall shall be coordinated with the owner of the main, New Orleans Public Service Inc.

10. PAYMENT.

10.1 Measurement. Each pipeline section crossing over the floodwall or levee, which is removed, replaced, and restored to service, will be measured as a unit, of the pipe size indicated, complete in place and accepted.

- a. Payment for providing each pipeline, drain line, manhole, pipe sleeve, and other incidental work will be made at the contract lump sum price for "Modification of Existing Utilities" which price and payment shall constitute full compensation for furnishing all plant, labor, materials, and other incidental work as stated above.
- b. Payment for any excavation and fill required for the above modifications, which fall outside the limits of the I-wall and T-wall structural excavation, will be included in the contract lump sum price for "Modifications of existing Utilities."

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SECTION 16A - CATHODIC PROTECTION

PART 1 - GENERAL

1. SCOPE. The work covered by this section consists of furnishing all plant, labor, material and equipment required to electrically bond the piling as shown on the drawings and as specified herein to permit installation of a cathodic protection system.

2. QUALITY CONTROL. The Contractor shall establish and maintain quality control for bonding operations to assure compliance with contract specifications and maintain records of his quality control for all construction operations including but not limited to the following:

- (1) Welds connecting No. 6 bar.
- (2) Installation of flexible jumpers.

2.2 Reporting. One original and two copies of these records and tests, as well as the records of corrective action taken, shall be furnished the Board daily. Format of report shall be prescribed in paragraph Special Clauses.

PART 2 - PRODUCTS

3. BONDING.

3.1 Reinforcing Bar. A No. 6 reinforcing bar shall be used for electrically bonding sheet piles.

3.2 Flexible Jumpers. Flexible jumpers shall be No. 1/0 A.W.G. Copper Type USE insulated with a minimum of 95 mils of cross-linked polyethelene insulation.

PART 3 - EXECUTION

4. BONDING, I-TYPE FLOODWALL. The sheet piles shall be electrically bonded together with a No. 6 reinforcing bar welded to the piles as shown on the drawings. Flexible jumpers shall be installed at all monolith joints and shall be welded, using an exothermic type process, to the sheet piling 3" below the bottom of the concrete.

5. BONDING, T-TYPE FLOODWALL OR GATE MONOLITHS. The sheet piles shall be electrically bonded together with a No. 6 reinforcing bar and flexible jumpers as indicated in 16A-4 and 16A-6. The sheet pile of the T-type wall shall be bonded to the I-type wall with flexible jumpers.

6. FLEXIBLE JUMPERS. Flexible jumpers shall be welded to the piling, using an exothermic type process. Welded joints shall be coated with splicing epoxy to obtain a moisture proof joint. The welding process shall be such that the heat of welding will not damage the insulation on the wire. The welding process shall be the Cadweld process of Erico Products, Inc., or equal.

7. PAYMENT.

7.1 Payment for furnishing and installing the No. 6 reinforcing bars and the flexible jumpers will be included in the contract lump sum price for " Structural Steel Gates, Miscellaneous Metals, and Specialty Items".

APPENDIX A

GENERAL SPECIFICATIONS
SECTION A
INFORMATION FOR BIDDERS AND GENERAL PROVISIONS

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INFORMATION FOR BIDDERS

FORM OF PROPOSALS

(1) All proposals must be made upon the Form of Proposal embodied in the Special Specifications for each contract and this form must not be detached from the Specifications. A cashier's check, a certified check, U. S. currency or a bid bond acceptable to the Sewerage and Water Board must be enclosed with each proposal and no proposal will be considered which does not comply with this requirement. Said bid bond shall be written in the same name of the party, firm or corporation offering the proposal. The amount of this deposit or bid bond shall be five per cent (5%) of the total amount of the proposal.

(2) Each proposal shall contain the full name and address of each person interested therein if made by an individual, a firm or a co-partnership; if made by a corporation it must be signed in the name of the corporation by some duly authorized officer or agent thereof who shall also subscribe his own name and office. If possible, the seal of the corporation shall be affixed. All prices must be written in full in words and also in figures; if there is a difference between the words and the figures in any price bid, the price written in words will be considered to be the true bid. No proposal will be considered unless prices are given for all items for which prices are asked, except when specifically provided otherwise in the special specifications.

PROPOSALS

(3) Proposals from any person, firm or corporation in default upon any contract with the Sewerage and Water Board will neither be received nor considered. Any proposal which does not fully comply with all of the provisions of the "Information for Bidders" and of the specifications will be considered informal and may be rejected.

(4) Permission will not be given to withdraw, alter or add to any proposal after the final time set for the receipt of sealed proposals.

(5) If two or more proposals are received, equal in amount and lower than any other proposal, the Board reserves the right to evaluate these proposals, item by item, and to decide which proposal will be accepted. Unless otherwise specified, the contract will be let as a whole to one bidder. Preference will be given to home contractors, all conditions being equal.

(6) The Sewerage and Water Board reserves the right to reject all proposals, and may exercise that right if doing so should appear to be to the best interests of the Board. The Board may waive informalities in the lowest proposal and accept this proposal if this should appear to be to the best interests of the Board.

DEPOSITS OR BID BONDS

(7) The deposits or bid bonds called for in paragraph No. 1, above, will be retained by the Sewerage and Water Board as the property of the bidders until the contract is awarded or all proposals are rejected. Upon the award of the contract, the deposits or bid bonds of all bidders, other than the lowest two (2) formal bidders will be returned. The return of the deposit or bid bond of the bidder to whom the contract is awarded is conditioned upon the successful bidder furnishing the insurance required in the specifications and his appearing before the Official Notary of the City of New Orleans within ten (10) consecutive calendar days after notice by the Executive Director or the Director of Management Services of the award of the contract and executing a contract and furnishing bond for the faithful fulfillment thereof according to the attached specifications. The deposit or bid bond of the next lowest bidder will be returned as soon as the successful bidder has executed his contract and furnished Bond. If all proposals are rejected, all deposits and bid bonds will be returned immediately.

BOND

(8) The said Bond for faithful fulfillment of the contract shall be for the full amount of the contract; it shall be executed by a surety company legally authorized to do business in the State of Louisiana, satisfactory to the Sewerage and Water Board. Should the bidder to whom the contract is awarded fail to appear within the specified period and execute the aforesaid Contract and Bond as herein set forth, his deposit or bid bond shall be forfeited and shall become the property of the Sewerage and Water Board as liquidated damages, and the said bidder shall cease to have any further rights to or in the contract. The Sewerage and Water Board may then proceed to advertise for new bids or to award the contract to the next-lowest bidder.

SIGNING OF CONTRACT AND BOND

(9) The Contract and Bond shall be signed in the City of New Orleans, before the Official Notary of the City of New Orleans, by the Contractor in person or by a duly authorized representative. The notarial fee for the execution of the contract shall be paid by the Contractor. The fee will be as follows:

Where contracts are over \$500 and not more than \$1,000	11.50
Where contracts are over \$1,000 and not more than \$10,000	23.00
Where contracts are over \$10,000 and not more than \$100,000	39.25
Where contracts are over \$100,000 and not more than \$250,000	86.25
Where contracts are over \$250,000	115.00

No contract for construction work exceeding the sum of Fifty Thousand Dollars (\$50,000) will have legal effect until it has been approved by the City Council of the City of New Orleans.

QUANTITIES IN PROPOSAL

(10) Where the quantities given in the Form of Proposal, though determined with as much accuracy as deemed necessary, are approximate only, these quantities, however, at the price bid for each item, shall determine the relative value of each proposal. The quantity of each individual item is not a binding feature of the bid or of the contract, however, the Sewerage and Water Board does not, either expressly or by implication, agree that the actual amount of work to be done will correspond to the quantities given in the Form of Proposal. Bidders must bear this in mind and should check the quantities by examination of the drawings, the contract requirements and the actual conditions at the site of the work. Unbalanced bids may be rejected.

BIDDER TO EXAMINE LOCATION

(11) Each bidder must thoroughly examine the location of the contract work and satisfy himself as to the surrounding conditions, the nature of the soil and the obstructions therein and all other difficulties to be overcome and must judge for himself the character of the work to be performed; the Sewerage and Water Board will in no wise be responsible for any errors, oversights or misjudgment of the bidder, nor will the Board make any allowance therefor. The Sewerage and Water Board is not to be held responsible for any oral information by any officer or employee of the Board concerning the nature of the soil strata or the obstacles to be encountered.

INTERPRETATION OF SPECIFICATIONS

(12) If any person contemplating submitting a proposal for a contract is in doubt as to the true meaning of any part of plans, specifications or other proposed contract documents, he may submit to the General Superintendent of the Sewerage and Water Board a written request for an interpretation thereof; the said request must be delivered at the office of the General Superintendent of the Board not less than seventy-two (72) hours before the time set for the opening of the proposals, and the person submitting the request shall be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by Addendum, duly issued, and a copy of such Addendum will be mailed or delivered to each person receiving a set of such documents. The Sewerage and Water Board will not be responsible for any other explanation or interpretation of the proposed documents.

LABOR REGULATIONS

(13) All work carried out under this contract shall comply with all laws, ordinances, regulations, etc., of the State of Louisiana and the City of New Orleans, relative to licenses, permits, approvals, etc., required by law or ordinarily secured under recognized good practice, which said licenses, permits, approvals, etc., shall be secured by the Contractor at his own expense.

(14) The attention of the Contractor is called to Section 26 of Act No. 6 of the Special Session of 1899 of the Legislature of Louisiana, as amended, reading as follows:

“Section 26: Be it further enacted, etc., That in all contracts made and executed by said Board for the construction or repair of said public systems of sewerage, water and drainage, there shall be contained a clause that the Contractor shall give the preference in employment to bona fide residents of the City of New Orleans, both as skilled and unskilled laborers, and shall not employ any non-resident laborers, skilled or unskilled (except confidential clerks, chief superintendents and chief engineers) as long as any resident labor is ready, willing and able to do the work required; that the penalty for each violation of this clause shall be the forfeiture of the sum of Twenty-Five dollars (\$25.00) for each person so unlawfully employed, to be deducted by the Board from the contract price due the contractor; and that the General Superintendent of said Board shall have authority to dismiss all persons employed in violation of this clause; provided that this

clause shall not apply to skilled mechanics and machinists brought to the City of New Orleans by the manufacturers of machinery solely for the purpose of erecting and testing the same."

"No person shall be considered a bona fide resident of the City of New Orleans under this clause of this act, unless he has actually resided in the City of New Orleans for one year prior to his employment."

(15) The attention of the Contractor is also especially called to Act No. 271 of 1908 of the Legislature of Louisiana, as amended by Act No. 116 of 1928 and Act No. 144 of 1934, reading in part as follows:

"Section 1: Be it enacted by the Legislature of Louisiana, that every contractor, superintendent or duly authorized agent engaged in, or personally in charge of, the construction of any state or public building, or public works, for the State of Louisiana, or any board, city commission or governmental agency of the State of Louisiana, shall employ only mechanics who are bona fide citizens and duly qualified voters of the State of Louisiana."

INSURANCE

(16) The Contractor shall maintain, at his own cost and expense, such insurance as will protect him from all claims for damages to public or private property or for personal injury, including death, to employees or to the public, which may arise from any operations under this contract or any of its subcontracts. The following are the types of insurance policies and the minimum limits of insurance coverage which shall be maintained by the Contractor during the entire term of the contract:

(a) **WORKMEN'S COMPENSATION INSURANCE**, as will protect him from claims under Workmen's Compensation Acts. The limit of liability under the Employers' Liability Section of the policy shall be in the amount of \$100,000. Whenever any vessel or floating equipment is involved, the insurance shall afford coverage under the Federal Longshoremen's and Harbor Workers' Act, and shall also include protection for injuries and/or death to Masters and Members of the crews of vessels (Jones Act), with limits of \$100,000 each person and \$500,000 each accident.

(b) **COMPREHENSIVE GENERAL LIABILITY INSURANCE**, with limits of liability for bodily injury and/or death of not less than \$500,000 for all injuries and/or deaths arising out of any one occurrence. The limits of liability for property damage shall not be less than \$100,000 for each occurrence and not less than \$500,000 aggregate, including Explosion, Collapse, and Underground Property Damage Hazards.

(c) **OWNER'S PROTECTIVE LIABILITY INSURANCE**, in the name of the Sewerage and Water Board of New Orleans and the City of New Orleans, as Named Insureds. The limits of liability shall be the same as specified in Paragraph (b) above, and shall include Explosion, Collapse and Underground Property Damage Hazards. Subcontractors need not provide the insurance required by this Paragraph (c).

(d) **COMPREHENSIVE AUTOMOBILE LIABILITY INSURANCE**, which shall include Hired Cars and Non-Ownership Coverage. The limits of liability for bodily injury and/or death shall not be less than \$100,000 for any one person and not less than \$500,000 for all injuries and/or death resulting from any one occurrence. The limit of liability for property damage shall not be less than \$100,000 for each occurrence.

(e) **PROPERTY INSURANCE**, required on all work except sewer and water drainage pipelines, reinforced concrete canals, work completely underground, and similar work (however Contractor is not relieved of responsibility therefor).

1. **BUILDERS RISK INSURANCE** (covering Fire, Extended Coverage, Vandalism and Malicious Mischief) will be carried on a completed value or reporting form, for not less than 100% of the value of the work, including foundations.

2. In addition, **INSTALLATION FLOATER INSURANCE** (on an "All Risks" form) will be carried on all machinery and equipment to be installed, whether furnished by the Sewerage and Water Board or by Contractor, for not less than 100% of the installed value of the machinery and equipment. This insurance shall be written in the same Insurance Company carrying the Builder's Risk Insurance (where possible), shall include testing, and shall terminate only when installation has been accepted by the Sewerage and Water Board.

(NOTE: "ALL RISKS" Builder's Risk Insurance will be acceptable in lieu of Builder's Risk and Installation Floater Insurance, and must meet the requirements of the Property Insurance above). The Builder's Risk and Installation Floater Policies required above shall include the names of the Sewerage and Water Board of New Orleans, and the City of New Orleans, and will cover the interests of all sub-contractors without specifically naming them. If the insurance is written subject to a deductible clause, Contractor assumes responsibility for the amount of the deductible.

The furnishing of insurance as provided above shall not relieve the Contractor of his responsibility for losses not covered by insurance. Prior to the signing of the contract, evidence of all such applicable insurance satisfactory to the Board shall be filed with the Executive Director of the Sewerage and Water Board. All policies shall be in insurance companies authorized to do business in Louisiana and shall remain in full force and effect until the final completion of the work and acceptance thereof by the authority of the Board. The Contractor and/or his insurer shall notify the Executive Director of the Sewerage and Water Board at least thirty (30) days in advance of any insurance coverage to be cancelled or of any insurance coverage that will expire. The Contractor shall then simultaneously furnish the Board evidence of new coverage to be effective the same day and hour of the expired or cancelled coverage. In the event the Contractor fails to submit this evidence of new coverage five (5) days prior to cancellation date or expiration date of any policy or policies, the Sewerage and Water Board will obtain the required coverage to become effective on date of cancellation or expiration of said policies. The cost of such new coverage shall be at the expense of the Contractor and any expenditures incurred by the Board for this coverage will be deducted from any balance due to the Contractor. Should the Board be unable to secure new coverage to take the place of the expired or cancelled policy or policies, a "stop work" order will be issued and all work on the contract shall cease on the same date and hour as the coverage ceases. Should the Contractor fail or refuse to secure coverage within five (5) days after the date of the "stop work" order, then in such case the Contractor shall be declared to be in default, and the contract between the parties shall be considered cancelled and of no force or effect between the parties reserving all rights of the Board against the Contractor and his surety.

LIENS

(17) The Contractor shall furnish the Sewerage and Water Board with satisfactory evidence that all persons who have done work or furnished materials under this Contract and are entitled to a lien therefor under any law of the State of Louisiana, have been fully paid or are no longer entitled to such a lien, and in case such evidence is not furnished, as aforesaid, such amounts as the Sewerage and Water Board may consider necessary to meet the lawful claims of the persons aforesaid, shall be retained from the money due the Contractor under this Contract, until the aforesaid liabilities have been fully discharged and the evidence thereof furnished to said Sewerage and Water Board. In lieu thereof, the Board may accept a Lien Bond.

PATENT RIGHTS

(18) The Contractor shall be liable for any and all royalties for any patented article or appliance furnished or used by him in the execution of this contract, and whenever the Sewerage and Water Board is formally notified or has reason to believe that a claim exists for royalty, damage, or loss of profits growing out of the use of any patents in the prosecution of such work, it shall have a right to retain out of any balance due to the said Contractor, an amount necessary, in its judgment, to satisfy such claim. The Contractor obligates himself to defend all claims or suits brought against the Sewerage and Water Board for infringement of patents, and in case he should neglect to do so, and his surety should fail to do so for him, the Sewerage and Water Board shall have the right to take all necessary proceedings at his expense.

CONTRACTOR NOT AN AGENT.

(19) It is well understood, that the right of supervision by the General Superintendent and other employees of the Board, does not make the Contractor an agent of the Board, and that the liability of the Contractor for all damages to persons or public or private property arising from the Contractor's execution of the work, is not lessened because of such right of supervision. This also applies when the Contractor's employees are employed on extra work or force account. Such right of supervision is retained in order to ensure to the Board the completion of the work, according to specifications, and to insure the public, in general, from all unnecessary inconvenience during the construction of the work.

GENERAL PROVISIONS

AUTHORITY OF GENERAL SUPERINTENDENT

(20) The Sewerage and Water Board (herein frequently called "The Board") will, in general, exercise its authority through its General Superintendent (herein frequently called "The Engineer"). The Engineer will assign to the work such assistants in the way of engineers, inspectors and other employees as are necessary to the proper conduct of the work and the inspection of materials and workmanship. All explanations or directions necessary for carrying out and completing satisfactorily the different descriptions of work contemplated and provided for under the plans and specifications, will be given by the said engineers, and the General Superintendent will finally decide all matters of dispute between the engineers and the Contractor, involving the character of the work, its quantity, and the compensation therefor.

All work under this contract, shall be done to satisfaction of the General Superintendent, who shall in all cases, determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for hereunder and shall decide all questions which may arise as to the fulfillment of this contract on the part of the Contractors.

INCREASE OR DIMINUTION OF QUANTITIES

(21) At any time or times, prior to the Engineer's making recommendation to the Board that the contract be accepted as completed, (see paragraph No. 59, below) he shall have the right to increase or diminish the quantities of the items of work to be done or materials, etc., to be furnished under this contract; the increase or diminution may be applied to any one item, or to any number of items, in the Form of Proposal; some items may be increased while others are diminished; new items of the same general character may be added, or any item or items may be eliminated entirely.

The total net dollar value of increase or diminution allowable in any contract under the terms of this paragraph, shall not exceed ten per cent (10%) of the total amount of the contract, as bid on in the Form of Proposal, unless otherwise stated in the Special Specifications; it shall in no case exceed twenty per cent (20%) of the said total amount of the contract, except with the written consent of the Contractor.

(22) It may be the intent of the Board to expend a certain fixed sum, within close limits, on any contract. The right is reserved, therefore, to increase the extent of the work, if bids be lower than was anticipated or to decrease the extent of work if bids be high. Any increase of work, under this clause, will be of the same nature as that bid on. The increase or diminution mentioned in paragraph No. 21, is at the option of the Board and is to be made for the best interests of the Board; the increase or diminution mentioned just above in this paragraph, on account of low or high bids, may be made in addition to the other, and independent of it.

If the Board shall decide to exercise the rights reserved in this paragraph No. 22, it must so notify the Contractor within five (5) consecutive calendar days after the date of the signing of the contract, and must at that same time, inform him as to the amount of the certain fixed sum which the Board intends to expend on this contract.

CHANGES IN LOCATION, ETC.

(23) The Sewerage and Water Board reserves the right to change the locations of the structures to be built under this contract if for any reason the Engineer deems satisfactory, whether to avoid obstructions, either on the surface or underground, to avoid cutting expensive pavements (whether intrinsically expensive or expensive because of an excessive price bid), to make better connection with other structures, or for any other reason tending toward greater economy or better construction. Should such changes in the location, alignment, grade, form or dimensions of any part of the work under the contract, be made by the Engineer, either before or after the commencement of the work, the Contractor shall have no claim against the Sewerage and Water Board on account of such changes, but shall accept as full compensation the price bid for each unit of work which he is required to do regardless of whether or not the location of said unit of work shall be as shown in the plans upon which proposals are invited and compared, provided that such changes of location shall not involve any additional burden or hazard to the Contractor. The Contractor will be compensated for any such additional unavoidable burden or hazards in an amount to be fixed by the Engineer.

ASSIGNMENT OR SUBLETTING OF CONTRACT

(24) The contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or contracts, or any portion thereof, or of his right title, or interest therein, without written consent of the Engineer. In case such consent is given, the Contractor will be permitted to sublet a portion thereof, but shall perform with his own organization, work amounting to not less than fifty per cent (50%) of the total contract cost, except that any items designated in the contract as "specialty items" may be performed by subcontract and the cost of any such "specialty items" so performed by subcontract may be deducted from the total cost before computing the amount of work required to be performed by the contractor with his own organization. No subcontracts, or transfer of contract, shall in any case release the contractor of his liability under the contract and bonds.

TRANSFERRING INTEREST IN CONTRACT

(25) No interest in this contract shall be transferred by the party or parties to whom the contract is awarded, and no assignment of the same, shall be made without the consent of the Sewerage and Water Board. Any transfer or assignment not approved by the Board, in writing, shall be null and void, and the Board can thereupon call upon the Contractor to complete his contract, call upon the bondsmen to take over, and complete the contract or cause the work to be given to other parties for completion, whichever may seem best to the Board.

FAILURE TO START, FAILURE TO COMPLETE

(26) The date of starting, the rate of progress and the time for completion of the work to be done under this contract, are understood and agreed to be essential conditions of the contract. If the Contractor shall fail to start work with an adequate force and adequate equipment and materials at the time required in the work order and at the place ordered by the Engineer, or if he shall fail to deliver materials in the required quantities and at the required time, he shall, for such failure, pay to the Sewerage and Water Board liquidated damages in the sum named in the Special Specifications, for each consecutive calendar day of delay in starting, beginning with the day named in the work order as the required day for starting work or for delivering materials and ending with the last day on which he shall not have complied with the order.

If the Contractor shall not have completed his work or completed delivery of his materials, as the case may be, within the time set in the Special Specifications, he shall, for such failure to complete his contract at the required time, pay to the Sewerage and Water Board liquidated damages in the sum named in the Special Specifications, for each consecutive calendar day that the work of the contract shall remain uncompleted beyond the time specified in the contract.

The Board shall retain liquidated damages for failure to start or failure to complete (and for failure to maintain proper progress, if the Special Specifications shall so provide) from any money due or to become due the Contractor under the operations of this contract and shall have the right to withhold the said money without being required formally to put the Contractor or his Surety, either or both, in default; if the money due the Contractor and available in the hands of the Board is not enough to cover the liquidated damages, the deficiency shall be supplied by his Surety. It is specifically understood and agreed that the said liquidated damages constitute compensation to the Board for actual damage suffered and not an arbitrary penalty.

However, the Contractor shall not be charged with liquidated damages or any excess cost for delay in starting or completing work or in making deliveries of materials when the said delay is due to unforeseeable causes beyond the control of the Contractor and without fault or negligence on his part, such unforeseeable causes including (but not restricted to) inability to obtain supplies and materials, Acts of God, acts of the public enemy, acts of the Sewerage and Water Board, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes or delays of subcontractors caused by such conditions. The relief of the Contractor from the charge of liquidated damages for delays due to the said causes is contingent, however, on his notifying the Sewerage and Water Board, in writing, of the causes of the delay within seven (7) consecutive calendar days after the beginning of such delay; the Board will then ascertain the facts and the probable extent of the delay and will, within a reasonable time, inform the Contractor of its decision in the matter.

FAILURE TO MAKE PROGRESS, BOARD'S RIGHT TO TAKE OVER

(27) If the work to be done under this contract shall be abandoned by the Contractor, or if at any time the Engineer shall be of the opinion that the performance of the contract is being unnecessarily delayed, or that the Contractor is willfully violating any of the conditions of these specifications, or of this contract, or that he is executing the said conditions in bad faith, the Engineer will notify the Contractor in writing, to that effect. Within the five (5) consecutive calendar days following the delivery of such notice to the Contractor, no tools, material or machinery shall be removed from the site of the work or from their accustomed storage place. If the Contractor does not, within the said five (5) days, take such measures as will, in the judgment of the Engineer, ensure the satisfactory continuation and completion of the work, the Engineer may then, by and with the consent of the Board, notify the Contractor to discontinue work on this contract, or either the whole contract or on some specified part or parts thereof, at the discretion of the Engineer. The Contractor shall immediately respect such notice and shall stop work and shall cease to have any right to possession of the ground, of the tools, machinery or materials upon the ground. The Engineer shall then have the power, under the direction of the Board, to place such and so many persons as he may deem advisable, by contract or otherwise, to work at and complete the work above referred to, and to use such tools, machinery and materials as he may find on the site of the said work or to procure other tools, machinery and materials as he may deem necessary to the proper carrying-on of the work, and to charge the expense of said labor, tools, machinery and materials to the Contractor. The expenses so charged shall be paid by the Sewerage and Water Board out of any money then due, or that may later become due the Contractor under the terms of this contract, and in case the said expenses are greater than the sum that would have been payable to the Contractor under the terms of this contract,

if the said work had been completed by the Contractor, then the Contractor or his surety, shall promptly reimburse the Board for the excess expense.

(28) The Contractor shall be prompt in issuing orders for the purchase of any machinery, equipment, or other articles which he is obligated to furnish under this contract and he shall notify the Engineer as soon as these orders have been issued. If, in the opinion of the Engineer, there is undue delay on the part of the Contractor in issuing the said purchase orders, the Engineer will notify the Contractor to that effect. If within ten (10) consecutive calendar days after the date of the Engineer's notice to the Contractor, the Engineer has not received satisfactory evidence of compliance therewith, the Engineer shall have the right to purchase for the Contractor's account, the said machinery, equipment or other articles and to have such work done in connection therewith, in his opinion, may be necessary for the prompt and proper performance of this part of the Contractor's obligations under this contract; he shall pay for the said machinery, etc., and for the work done in connection therewith, out of any monies due or to become due the Contractor under this Contract, and the Board shall not be held liable for any loss or damage claimed by the Contractor for materials purchased or work done under the provisions of this paragraph.

EXTENSION OF TIME

(29) The Sewerage and Water Board may, at its discretion, and for any cause which it may deem sufficient, extend the times set for starting and for completing this contract, either or both.

BONDSMEN WAIVE RIGHT TO SPECIAL NOTICE

(30) It is distinctly understood and agreed that the bondsmen have familiarized themselves with the wording of this contract and that they waive the right of special notification of changes in the plan contemplated in this contract, of extensions of time, of decreased or increased work, of the cancellation of the contract, or of any other act or acts by the Sewerage and Water Board or its authorized agents under the terms of this contract; failure to notify bondsmen of changes shall in no way relieve the bondsmen from their obligations under the contract.

EXTRA WORK

(31) When, for the proper prosecution of a contract, work becomes necessary which has not been provided for in any clause of the contract, the Engineer will issue an order, and the Contractor shall perform the work stated in the order. Such work, frequently called "Extra Work," may be paid for in any or all of the following ways as determined by the Engineer in each case:

(a) On A Unit Price Basis:

Such items of Extra Work, as are covered by unit prices bid or fixed in the Contractor's proposal, will be paid for at the said prices; for such items of Extra Work as are not covered by unit prices bid or fixed in the proposal payment, will be made at unit prices agreed on by the Engineer and the Contractor before the order is issued. These unit prices shall be written into the contract as unit prices for added items and these prices shall apply to similar items in any subsequent Extra Work. Payments will be made and retainers withheld on these added items the same as on the items bid on in the original proposal.

(b) On A Lump Sum Basis:

A lump sum price for the whole proposed piece of Extra Work will be agreed on by the Engineer and the Contractor before the order is issued. This lump sum price shall be written into the contract as a price for an added item. Payments will be made and retainers withheld on such added items the same as on the items bid on in the original proposal.

(c) On A Force Account:

This method of payment is to be used only where it is impracticable to use either method (a) or method (b). The Contractor will be paid for all general foremen, foremen, labor, teams and trucks actually engaged on such specific work for the time actually so employed at the rates actually paid, but not exceeding the rates paid similar workmen, etc., on similar work on the remainder of the contract and for all materials and insurance involved in the Extra Work at the actual cost thereof. For the use of power equipment and machinery he will be paid a reasonable rental, calculated either on the rent-per-day rates, or the rent-per-month rates, whichever is the lesser, which shall include the cost of fuel, lubricants, etc., to be determined in advance by agreement between the Engineer and the Contractor.

In addition to the above stated payment for labor, materials, insurance and equipment rental, the Contractor will be paid a fee for his superintendence, general expense and profit. This fee paid to the Contractor shall be understood also to reimburse him for any sub-contractor's general expense and profit which the Contractor may allow to one or more sub-contractors, if any such "force account" extra work is done under sub-contract. This fee shall be twenty (20) per cent of the cost of the labor, materials, insurance, and equipment rental incurred in doing the Extra Work. Payment for Extra Work done on this basis will be made month by month as the bills are rendered by the Contractor for the work done during each calendar month; the payment will be complete, no retainer will be withheld. Where Extra Work is to be done by force account the Engineer shall have the right to appoint a timekeeper to represent the Board and the Contractor shall furnish this timekeeper all facilities for obtaining a correct record of the time and the rates of the men and the equipment employed.

LABORATORY INSPECTION

(32) If the Engineer shall require laboratory inspection and testing, either or both, of any of the materials entering into the work being done under this contract, the Board will designate a laboratory of recognized standing for this purpose. The laboratory so designated will render bills for the inspection and the testing direct to the Sewerage and Water Board, the Contractor will not bear any part of the cost of the inspection and testing service, except that he must furnish, free of charge, the samples of materials required by the laboratory for the tests.

DRAWINGS AND SPECIFICATIONS

(33) The Contractor will be furnished with a set of drawings showing the details and dimensions necessary to carry out the work; dimensions given in figures shall have preference over the scale, and the Contractor shall verify these figures. The plans of the work and a copy of these specifications shall be kept constantly at the work by the Contractor or his authorized foreman. No deviation from the drawings will be allowed without the written direction of the Engineer. The drawings and specifications are intended to be explanatory of each other, but should any discrepancy appear, or dispute arise as to the true meanings of the drawings and specifications in any point, the decision of the Engineer shall be final and conclusive. The plans and drawings furnished prospective bidders are intended to give a closely approximated idea of the proposed works, but are subject to such revision as the Engineer may deem necessary, or to the working out of fuller details where such may be needed to obtain the results desired as each particular point is reached in the progress of the work.

(34) The plans and specifications are intended to show the materials and methods to be used to complete the contract thoroughly and well but it is not intended that every detail of construction shall be shown. The Board cannot be held responsible for the lack of any detail the Contractor may require, nor for failure to provide in advance for any special construction which may be found necessary as the work progresses; plans showing such details or special construction, will be made and furnished the Contractor as occasion arises. No extra compensation above that for the additional quantity of the items involved, will be allowed the Contractor, unless it can be clearly shown that such special construction is beyond the scope and intent of the original plans and specifications. The Engineer shall have full power to decide as to the proper compensation for such work. The Engineer shall have the right to correct any clerical, mathematical or minor errors or omission in the contract, specifications or drawings, when such correction is necessary for the proper fulfillment of the contract. The Contractor does not warrant the plans and specifications to be in compliance with applicable laws, ordinances, regulations or building requirements or to be sufficient to perform the work required under this contract.

INSPECTION BY ENGINEER

(35) The Engineer shall have the right of access, at all times, to all work being constructed for this contract and to measure, inspect and test all work or material, either at the shops where it is made, or on the ground, and the Contractor shall provide safe and reasonable facilities therefor and prepare such customary samples as may be required.

DEFECTIVE WORK

(36) The inspection of the work at any time shall not relieve the Contractor of any of his obligations to fulfill his contract as herein described, and any defective work shall be made good, and any unsuitable materials may be rejected, notwithstanding that such work and materials have been previously overlooked by the Engineer and accepted or estimated for payment.

QUALITY OF WORK

(37) All material and work, whether the quantity, dimensions and quality, are shown on the plans or fully specified in the specifications or not, are to be furnished in sufficient quantity and of sufficient dimensions for the proper execution of the work, and the quality and workmanship are to be the best throughout.

REJECTED MATERIAL

(38) The Engineer shall have the power to condemn any material or work which he considers is not in accordance with the plans or specifications, and the Contractor shall remove such rejected material from the site of the work immediately and not offer it again for inspection.

PATENTED ARTICLES AND ALTERNATES

(39) In any case, under these specifications where articles are specified as of a stated manufacture, or equal, or where in describing any stated item a patented process or device is included, the General Superintendent shall have the right to accept other devices or processes which will, in his judgment, accomplish the same objects with equally good results and which are of equal durability and value. If articles, products or processes are to be offered as "equal" to those specifically mentioned, they shall be presented for consideration and approval by the Engineer within two (2) weeks after the award of the contract and the decision of the Engineer shall be final.

RESPONSIBILITY OF CONTRACTOR

(40) The Contractor shall furnish all transportation, scaffolding, bracing, apparatus, ways, works, machinery, paint and appliances requisite for the proper construction of his work under this contract. He shall cover or otherwise protect his work from loss or damage until the final acceptance of the contract, and shall repair promptly any injury done to it. All such loss or damage or injury is entirely his responsibility, whether the said work be completed or uncompleted, including any loss or damage to property of the Contractor or to materials in his possession, whether furnished by himself or by the Board.

He is responsible to the Board for damage caused by settlement of the ground due to his work caused by improper, illegal or negligent conduct of himself, his employees or his sub-contractors or by the improper use of any scaffolding, bracing, or apparatus, whether such damage is done to persons or to property including buildings in or near which his work is being done--whether the property be privately or publicly owned. He shall save harmless the Board from all claims relating to labor and materials furnished for the work, or to inventions, patents and patent rights for articles and methods used in the work or in doing the work.

OFFICE AND RESIDENCE OF CONTRACTOR

(41) Any Contractor whose contract involves the furnishing and installing of materials in place in New Orleans, shall maintain an office in New Orleans, during the full terms of his responsibility under his contract, where mail can be received and notices served and received by the Contractor or his authorized agent. Communications forwarded by the United States mail are to be considered as having been delivered and received. The Contractor, or his authorized agent, shall also keep the Board advised of his place of residence and mail, addressed to the said residence, or notice delivered at the same said residence, shall have the same effect and force as if delivered at the aforesaid office of the Contractor.

SUPERVISION BY CONTRACTOR

(42) The Contractor shall give his personal supervision to the faithful prosecution of the work and shall keep it under his personal control. In his absence, he shall have a competent representative or foreman on the work, who shall follow, without delay, all instructions of the Engineer or his assistants in connection with this contract, and shall have full authority to supply equipment, material and labor immediately.

RESPONSIBILITY FOR DAMAGES

(43) The Contractor shall be responsible for any damage or loss of material during the progress of the work, until its final acceptance; he shall also be responsible for any damage by fire or the elements up to the time of the acceptance of the contract.

CONTRACTOR'S NEGLIGENCE

(44) When the Contractor has been notified in writing by the Engineer of any requirements or precautions neglected or omitted or any work improperly constructed, he shall attend to them at such times as directed; if he fails to do so, the Engineer may perform such work at the Contractor's expense and deduct the cost thereof from any amounts due, or to become due, the Contractor.

COOPERATION WITH OTHER CONTRACTORS

(45) The Engineer will require the Contractor to cooperate with other Contractors having contracts adjoining his own, and to give them necessary facilities in building and completing the work at the junctions of the contracts, to such an extent as to avoid any undue burden on either Contractor.

LINES, GRADES, ETC.

(46) The Engineer will give all the necessary lines, levels, grades, etc., for the guidance of the Contractor, and the Contractor shall be responsible for the conformity of the work thereto. The Contractor shall provide suitable stakes and forms and shall render such assistance to the Engineer, at his own expense, as may be necessary to establish lines and grades for the guidance of his work, and shall carefully preserve the points so established at all times. Work done without lines, levels, and instructions having been given by the Engineer, or done during the absence of an inspector, will not be estimated nor paid for.

COMPETENT, ORDERLY WORKMEN REQUIRED

(47) Only competent men shall be employed on the work; if the Engineer shall notify the Contractor that any man on the work is incompetent, unfaithful or disorderly, or that he is abusive or threatening to inspectors, engineers, etc., such man shall be removed from the work at once.

NIGHT OR SUNDAY WORK

(48) No night or Sunday work requiring the presence of an engineer or inspector, will be permitted except in cases of emergency, and then only to such an extent as is absolutely necessary, and with the written permission of the Engineer; however, this clause does not operate in case of a gang, organized with the approval of the Engineer, for regular and continuous night work.

POLICE AND HEALTH REGULATIONS

(49) The Contractor shall comply with all police and health regulations of the City and State.

SIGNS, LIGHTS, WATCHMEN

(50) Wherever the Contractor's excavations are open, he shall keep conspicuously posted a sign bearing the words "Sewerage and Water Board Work" and the name of the Contractor, together with his office address, all in plain letters legible 100 feet away. The Contractor shall place sufficient lights on or near the work, and keep them burning from twilight to sunrise, shall erect a suitable railing or protection about all open trenches and other dangerous places, and provide on the work, day or night, all watchmen and flagmen, when necessary for the safety of the public.

CLEARING SITE

(51) The Contractor shall, at his own expense, clear away brush, weeds or other surface obstructions along the line of work, sufficiently for its proper prosecution, and so as to afford facilities for staking out the work and inspecting it.

WORK STRUCTURES

(52) The Contractor may build such sheds, storehouses, shops, etc., as may be necessary, provided such structures do not interfere with the reasonable public use of the streets or sidewalks. The location and construction of these are subject to the approval of the Engineer.

SANITARY ARRANGEMENTS

(53) Necessary sanitary conveniences for the use of the laborers on the work, shall be constructed by the Contractor wherever needed, secluded from public observation and maintained in a proper sanitary condition and in accordance with the regulations of the Sewerage and Water Board and the directions of the Engineer.

CLEANING UP

(54) On or before completion of the work, the Contractor shall, without charge therefor, carefully clean up all work executed by him, shall tear down and remove all temporary structures built by him and shall remove all rubbish of all kinds from any of the ground which he has occupied and leave them in first class condition. Before final acceptance each part shall be in condition and order at the expense of the Contractor.

MONTHLY PAYMENTS TO CONTRACTOR

(55) Neither the Sewerage and Water Board nor any member or agent thereof, shall be liable for, or be held to pay any money to the Contractor, except as provided in these specifications, and on making the last payment therein, provided the Sewerage and Water Board and every agent thereof, shall be released from all claims or liability to the Contractor, for anything done or unfinished relating to the work of this contractor or for any act or neglect of the Sewerage and Water Board, relating to or affecting the work of the contract, except the claim against the Sewerage and Water Board for any remainder of the amounts retained as provided in these specifications.

(56) The Contractor shall accept payment for the quantities of work actually performed, at the prices bid in his proposal, plus whatever payments for extra work may be approved and less any deductions provided for in the contract, as full compensation for furnishing all the labor, materials, tools, equipment, etc., needed to complete the whole work of the contract, well and faithfully done, in accordance with the drawings and specifications, and meeting the requirements of the Engineer; also as full compensation for all loss, damages or risks of every description, connected with or resulting from the nature of the work, or from any obstructions or difficulties encountered, of any sort or nature whatsoever, or from the action of the elements; also for all expenses in consequence of the suspension or discontinuance of the work as provided for in the contract.

(57) On or about the last day of each calendar month during construction, the Board's Engineer will estimate the total amount to date of the work done and acceptable according to the specifications, and the value of the said work at the prices bid or fixed in the contract, including such extra work as may have been approved and completed according to the provisions of sections (a) and (b) of paragraph No. 31, above. In the Special Specifications for each contract, there will be designated a percentage of the said value of the work done which will be retained by the Board, as is specified below in paragraph No. 60. The said percentage will be deducted from the amount earned, and the remainder, of the amount earned, less all legal deductions and all previous payments, will be paid to the Contractor not later than the fifteenth (15th) day of the next following calendar month.

ADVANCES FOR MATERIALS DELIVERED

(58) If it is so provided in the Special Specifications for any contract, the Board will make allowances for materials delivered but not yet used as is set forth below:

On or about the last day of each calendar month, during construction, the Board's Engineer will estimate the quantities of the several materials actually delivered to the site of the work, and as yet unused. The Sewerage and Water Board will advance to the Contractor in the monthly estimate, an amount equal to Ninety (90) per cent of their value, as represented by invoices verified by the Engineer. Each monthly advance on materials delivered, will in the next monthly estimate, be treated as a part of the amount already paid, and will be deducted from the amount then due on the contract.

COMPLETION OF CONTRACT AND FINAL PAYMENT

(59) When the contract has been completed and tendered for acceptance, the Engineer will have it carefully inspected for defects and remeasured to verify the quantities. If no defects are discovered, or when any defects found to exist have been repaired by the Contractor at his own expense, so that all the structures built by him, under this contract, and all the paved or unpaved surfaces disturbed by the work of this contract, are in acceptable conditions, as may be more fully set forth in that Section of the General Specifications covering the class of work done under this contract, or in the Special Specifications for this contract, either or both, the Engineer will recommend that the contract be accepted by the Board.

FINAL PAYMENT AND LIEN PERIOD

(60) The percentage of the value of the work done, as stated in Paragraph 57 above and particularly specified in the special specifications, will be withheld by the Board for a period of not less than forty-five (45) consecutive calendar days after the contract has been accepted by the Board, and such acceptance has been recorded in the Office of the Recorder of Mortgages for the Parish of Orleans. At the end of the forty-five (45) day period, the percentage withheld by the Board, will be paid to the Contractor, less any sums that may be legally deducted under any provisions of this contract, upon the Contractor or furnishing the Board with a certificate from the Recorder of Mortgages for the Parish of Orleans, certifying that the contract is clear of all liens and privileges.

MAINTENANCE PERIOD

(61) The maintenance period under this contract, except as otherwise specifically provided for herein, shall be for a period of forty-five (45) consecutive calendar days beginning from the day after the contract has been accepted by the Board, and such acceptance has been recorded in the Office of the Recorder of Mortgages for the Parish of Orleans. During the maintenance period, the Contractor will repair, at his own expense, all defects in the work that may arise, to the satisfaction of the Engineer. The Contractor shall restore all surfaces for which he is responsible under the specifications, whether unimproved, partially improved, or paved surfaces (See Section B of the General Specifications), and maintain them in good condition to the satisfaction of the Engineer. If the Contractor should fail or refuse to repair, at his own expense, any defects in structures or surfaces developing before the expiration of the aforesaid forty-five (45) days or to adjust satisfactorily any claims for damages to public or private property, the Board shall have the right to continue to hold the retainer and to make the necessary repairs and to satisfy the claims for damages, by such means as the Board shall elect, and to reimburse itself for the cost of these repairs and satisfied claims, out of the said retainer. Any surplus of this retainer will then be paid the Contractor, under the conditions above stated, any deficiency shall be made good by the surety.

UNSATISFACTORY WORK

(62) The Contractor shall re-execute any work that fails to conform to the requirements of the contract, and any defective work that appears during the progress of the work, and shall remedy any defects due to faulty materials or workmanship, which appear, within a period of one (1) year from the date of acceptance of the contract is recorded in the Office of the Recorder of Mortgages for the Parish of Orleans. The provisions of this paragraph apply to work done by direct employees of the Contractor and by subcontractors as well.

RIGHT TO MODIFY PREVIOUS ESTIMATES

(63) It is expressly understood and agreed, that until the final payment on this contract has been made, the Sewerage and Water Board shall not be precluded or stopped by any estimate, return of certificate, previously made or given by any engineer, inspector or other officer, agent or appointee of said Sewerage and Water Board, from ascertaining and showing the true and correct amount and character of the work which shall have been done, and the materials which shall have been furnished by the Contractor under this contract, nor from correcting any errors or omissions in any previous estimates, returns or certificates. Any money due or to become due the Contractor under this contract, may be retained by the Board to make correction of such errors or omissions, and if the said money shall be insufficient the Surety shall make the amount good.

CONTRACT TO BE IN ACCEPTABLE CONDITION AT TIME OF FINAL PAYMENT

(64) It is the intent of these specifications, and of the essence of this contract, that the Contractor shall deliver to the Board, at the end of the aforesaid maintenance period of forty-five (45) calendar days, all the work done under this contract free from defects and acceptable in all respects, conforming to the Special Specifications for this contract and to the General Specifications covering the class of work done under this contract.

WAIVER OF JURISDICTION

(65) The Contractor and his Surety will consent and yield to the jurisdiction of the Civil District Court of the Parish of Orleans, State of Louisiana and will formally waive any plea of lack of jurisdiction on account of their residence or domicile elsewhere, in the event of suit under the Contract or Bond.

GENERAL SPECIFICATIONS
SECTION B
GENERAL CONSTRUCTION MATTERS

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RIGHT OF WAY

(1) The Sewerage & Water Board will furnish the Contractor with all necessary rights-of-way for the prosecution of his work. The right-of-way herein referred to is understood to mean only the permission to use and pass through the location or space in any street or highway, or through any public or private property in which the Contractor is to construct the work. The removal of any buildings, works or structures of any kind, including telephone and telegraph poles, power cables and wires, or other structures, in, on or over the public streets and roads, is a duty which the law imposes upon the owners of said structures and the Contractor shall make arrangements with the owners for their removal; upon the failure or refusal of the owners to so remove, they shall be removed at the expense of the owners; provided said structures interfere with the normal construction operations.

(2) The Contractor shall not cut, trim or damage in any way any tree or large shrub along the line of the work without the permission of the Engineer in each case. The Engineer reserves the right to forbid the use of any machine or any method of work that, in his opinion, is likely to cause damage to trees, etc.

OBSTRUCTION OF STREETS, PREMISES, ETC.

(3) All material excavated shall be placed so as to interfere as little as possible with public travel. At such street crossings and other points as may be directed by the Engineer the trenches shall be bridged in a proper and secure manner so as to prevent any serious interruption of travel upon the roadway or sidewalk and also to afford necessary access to particular public or private premises. The cost of all such work must be included in the prices bid for the various items of the contract.

(4) Alternate streets crossing the work must be kept open unless the Engineer shall authorize their closing; public safety must be conserved but the Engineer's rulings on this matter will be as liberal to the Contractor as conditions permit. The Contractor must notify the Department of Public Safety as far in advance as possible, at any rate not less than twenty-four (24) hours, before the closing to traffic of any street and must notify the Department again when the street is open to traffic.

(5) Special care must be taken to give free access at all times to all fire hydrants, water valves, fire alarm boxes, mail boxes and, as far as possible, all driveways. In case the Contractor shall fail to keep open streets, sidewalks, approaches to premises, etc., and shall refuse or neglect to open them within twelve (12) hours after written notification by the Engineer or shall fail to afford proper and necessary access to fire hydrants, water valves, fire alarm boxes, mail boxes or driveways and shall neglect or refuse to afford such access within three (3) hours of receiving either oral or written notice to do so the General Superintendent shall be, and he is hereby, authorized and empowered to put on such force as may be necessary and to open the required passage ways or provide the required access, deducting the actual cost thereof from any money which may be due or may become due the Contractor.

CONFLICT WITH SURFACE OBSTRUCTIONS

(6) The Contractor shall be responsible for all poles, posts, gallery supports or any other structures or objects (except as otherwise specified in paragraph No. 1, above,) existing along the line of his work within or without the limits of the excavation, he shall shore or otherwise support them when necessary and shall repair and make good any damage caused thereto by his work. The Board will not bear the expense of supporting or removing and replacing any such visible surface structures. All culverts, bridge plates, crossing stones, etc., destroyed or disturbed in the execution of the contract shall be properly replaced by the Contractor as part of his obligations under the contract with no direct payment therefor. Substantial bridges in the line of the work must be dealt with as directed in the Special Specifications in each case.

CONFLICT WITH SUB-SURFACE OBSTRUCTIONS

(7) Care must be taken not to injure any gas or water pipe or sewer or drain or service pipes connected therewith or conduits or other underground structures and the Contractor must repair or have repaired at once, at his own cost, any public or private structure damaged by or in the course of his work unless the Board should decide to exercise the right reserved in paragraph No. 8, just below. Should the Contractor fail to repair or have repaired such damage or injury within a reasonable time the General Superintendent may, after twenty-four (24) hours written notice, have such repairs made and deduct the cost thereof from any amounts due or to become due the Contractor.

(8) The Board reserves the right to repair with its own forces any damage done to sewers, water mains, drain pipes, connections thereto, hydrants, valves, cable conduits or other structures belonging to the Sewerage and Water Board. If the Board exercises this right it will make all necessary repairs, allowing the Contractor full opportunity for inspecting and checking the cost of the work, and will deduct the actual cost thereof from any money due or to become due the Contractor.

These repairs will include everything necessary to restore the damaged structure to as good condition in all respects as prior to the Contractor's work. This may include the use of foundation material where none had been used before or different materials or types of construction from the original if these should be necessary to provide a new structure as stable and substantial as the one damaged.

(9) Nothing in paragraph No. 8, just above, shall be construed as forbidding the Contractor to cut and restore drainage canals or other structures of the Board's where the plans of the work or the Engineer's orders require such cutting as a part of the Contractor's work.

(10) Should the location or position of any gas or water pipe, sewer, drain, conduit or other obstruction within the limits of the trench be such that it conflicts in line and grade with the structure being installed under this contract or conflicts otherwise so as, in the opinion of the Engineer, to require its removal, realignment or change in order that the work being done under the contract may proceed according to the plans, such removal, realignment or change will be made without expense to the Contractor. When, however, such gas or water pipe or other obstruction shall come within the limits of the excavation for the work as located by the Engineer, such pipe, conduit, or other obstruction shall be stripped or uncovered by the Contractor, at his own expense, as constituting a part of his work in excavating. No claim for damages or extra compensation shall accrue to the Contractor from the presence of such pipe or other obstruction or from any delay due to its removal or rearrangement.

(11) In case any pipe or other obstruction so located as to interfere with the work is unexpectedly encountered the Contractor shall at once notify the Engineer of the locality and circumstances and the place shall be passed over until satisfactory arrangements for avoiding the conflict are made without any claim for damages arising from the delay.

(12) The Engineer will in all cases be the judge of the necessity or expediency of any change or rearrangement of any underground structures which may interfere with the construction of the work of this contract.

(13) The Contractor shall take all risks and be responsible for all expense and damage attending the presence or proximity of any gas or water pipes, sewers, drains, conduits or other underground structures where such pipes or other structures cross the trench or appear in the trench in such a manner as not to demand their rearrangement or realignment, also of all such structures as are approximately parallel with the trench or adjacent to it but outside of the trench. The Board is under no obligation to inform the Contractor of the presence or the location of any obstacles either on the surface or underground, the Contractor must make his own investigations. Should such information be furnished by the Board such act shall not be construed as a waiver of the Contractor's liability, but rather as an attempt on the part of the Board to minimize the Contractor's hazards.

(14) Where a pipe, a conduit, or some other structure comes within the limits of the trench, such pipe or other structure shall be supported properly, and the Engineer shall have the right to direct the manner in which it shall be supported. Any lumber used for such purposes will be left in the trench without any payment being made for it as the Contractor is responsible for the care of conflicting underground structures.

CROSSINGS OF DRAINAGE CANALS, ETC.

(15) The fact that a sewer or some other structure being installed under this contract according to the drawings furnished crosses over or under a waterway, either natural or artificial, a railroad track, a pipe or culvert or any other structure or condition tending to make its installation more costly than normal shall not be cause for any extra charge above the price bid per linear foot for the said sewer, etc., the bidder is required to take note of such conditions when making his bid. However, such a crossing is brought about by a change in the location of the sewer, etc., after the bids have been received, then the sewer, etc., will be paid for at the price bid and the additional quantities of work and materials required because of the new location will be paid for at the prices bid for such work and materials, or as extra work, or else a price for new items covering a sewer, etc., laid under the new conditions, will be agreed on by the Engineer and the Contractor. Special crossings for which drawings have been made, on which special prices have been asked, will be paid for according to the special specifications governing the said crossings.

(16) Natural or artificial streams or lagoons, drainage or navigation canals, gutters or culverts, shall not be unreasonably blocked or obstructed or prevented from carrying their customary drainage or traffic and shall be replaced by the Contractor in as good condition as they were originally, without charge. The Contractor shall be responsible for any damage of any kind resulting from interference with or obstruction of any drainage canal or other waterway. The Sewerage and Water Board will secure the permits for crossing canals, streams or other waterways but the Contractor will be held to a strict compliance with the terms under which such permits may be issued.

CROSSING UNDER TRACKS

(17) When any railroad or street railway tracks are encountered in the course of the work done under the contract the Contractor shall take utmost precautions to avoid injury to the roadbed or tracks of such railroads and to avoid any unnecessary delays or interruptions of traffic. The Engineer shall have the right to forbid the use of any methods or details of construction that he may deem unsafe or unwise but the Contractor will be held fully responsible for all risks and damages attending such work. The Contractor shall notify the owner or lessee of any railroad track or switch track, or any street railway track of the contemplated crossing of the track at least forty-eight (48) hours in advance.

(18) The Board has the right to require that any tracks in dedicated streets be supported by the owners of the tracks over the excavations of the Board or the Board's Contractor in the said streets and under the said tracks. If the Engineer shall require the structure being built under this contract to be laid in an open trench under any such track or tracks the Board will call on the owner of each track to support his track over the Contractor's excavation without cost to the Contractor, the type of support will be determined by the owner of each track. However, the Contractor must provide for the safety of his excavation and must sheet the sides or otherwise secure them to the satisfaction of the Engineer. If the Engineer shall require the Contractor to install his structures under tracks in the manner just described the payment for the work done will be at the prices bid for the units of work involved, no extra charge for added difficulty or cost of crossing under an obstruction will be allowed, the added cost must be included in the unit prices bid.

(19) The contract may require pipe sewers, pipe drains, water mains or similar structures to be jacked into place under railroad tracks (rarely under street railway tracks) so as to avoid interruption and hazard to rail traffic. In such cases the work will be paid for at the prices bid for such pipes, etc., jacked into place and explanatory drawings will be provided.

HANDLING AND DISPOSAL OF WATER

(20) The Contractor shall pump, or otherwise remove, any standing water encountered in the area of his work or water accumulating in his excavations and shall do all the work necessary to keep his excavations free of water while the work

in progress. He shall keep his completed work free from excessive quantities of water and shall free it entirely for the purpose of inspection, etc., at such times as the Engineer may direct.

(21) Gutters or drains parallel with the trench or crossing the trench must be maintained unobstructed; when necessary proper platforms shall be built over them to carry the excavated material or suitable flumes or diversion channels must be built so as to permit the free passage of all drainage water without interference. The Contractor must use due vigilance and care so that no water originating on his work or dammed up by his work or which he is obligated to handle and dispose of under his contract, shall be discharged upon the works or into the premises or structures of another party unless by mutual agreement of the parties affected. Should any dispute or disagreement arise from this cause the matter shall be referred to the Engineer for final settlement. Nothing in this section is to be construed as preventing the reasonable and proper use by the Contractor of any ditch, canal or gutter which is designed and used for City drainage.

(22) The cost of all such handling and disposing of water as is outlined in paragraphs Nos. 20 and 21, just above, shall be included in the prices bid for the work being done, it will not be paid for as such.

CLEANING UP, REMOVING SURPLUS EARTH, ETC.

(23) The hardest and driest of the excavated material—the broken pavement material if the trench is in a pavement—shall be set aside until the trench has been backfilled and then it shall be placed on top of the tamped backfill and tamped so as to provide promptly a surface as good and serviceable as possible for temporary traffic or pedestrian use, or used otherwise as is directed in paragraph No. 26 below. The Contractor shall not, without the permission of the Engineer, remove from the line of the work any earth excavated therefrom which may be suitable for backfilling or surfacing until the excavation has been refilled and surfaced. Any surplus earth which may be left on the street after the excavations have been completely refilled shall be regarded as the property of the Contractor and must be removed as soon as possible at his expense except that in ungraded streets it shall be optional with the Engineer whether surplus material shall be removed or deposited on the surface and graded.

(24) Specifications for overhaul will be written in the Special Specifications for any contract in which it may be required.

CARE OF SURFACES IN UNIMPROVED STREETS

(25) Excavations in undeveloped areas where the streets have not been opened to traffic must be thoroughly backfilled and tamped; the backfill must be crowned well above the level of the adjacent ground surface and topped as required in the opening sentence of paragraph No. 23, above; settlement of the backfill below the general surface must be refilled promptly. The cost of such care must be included in the prices bid for laying the sewers, the drains, the water mains, etc. The Engineer will designate streets that may be treated in this manner.

Excavations in streets that have been opened for traffic and are in use by vehicles and pedestrians but have not been given any surface improvement must be treated as is specified just above in this paragraph except that the crowned, tamped and topped backfilling must not stand more than six (6) inches above the level of the adjoining ground surface, the backfilling in these streets must be kept filled and compacted so that traffic across the trench is possible at all times; the cost of all such care must be included in the prices bid for laying the sewers, the drains, the water mains, etc. The Engineer may direct the Contractor to furnish shells—either clam shells or oyster shells, at the Engineer's option—and to place them, spread them and compact them over the excavations so as to form a good surface, usable for traffic, over a specified area. For furnishing, placing, spreading and compacting these shells, in such quantity as the Engineer shall direct, the Contractor will be paid for the quantity actually placed (measured in the truck before dumping) at the price bid for clam shells or oyster shells, as the case may be, in the Form of Proposal.

Surfaces such as are described in this paragraph No. 25 are known as "unimproved surfaces"; all unimproved surfaces shall be maintained as specified just above until the end of the maintenance period mentioned in paragraph No. 63 in Section A of the General Specifications.

CARE OF SURFACES IN PARTIALLY IMPROVED STREETS

(26) When an excavation has been made in a street which has been paved with gravel or shells or some similar material, or in a street which has not been paved but has been filled with broken concrete, shells, gravel or similar materials or combinations thereof so as to make a hard usable surface for roadway or sidewalk, the Contractor shall carefully remove and save this hard filling and shall use it for backfilling the upper part of the trench, up to nine (9) inches below the general street surface. On this selected backfilling, after it has been well tamped, the Contractor shall place dead reef shells to a depth of one (1) foot, leaving the top of the layer of shells about three (3) inches above the general street surface. The Engineer may direct that the edges of the trench be cut back from the authorized side of the ditch, if he considers it necessary, before these shells are put in place. For trimming the edges of the trench when so ordered and for furnishing and placing the reef shells as described just above the Contractor will be paid the price per square yard bid for restoring partially improved surfaces; measurement will be for the actual width of shells placed up to nine (9) inches additional on each side beyond the authorized trench width.

Later settlement of the trench area or of immediately adjoining areas shall be filled with clam shells and kept filled until the end of the maintenance period described in paragraph No. 63 of Section A of the General Specifications. All such subsequent repairs must be made by the Contractor at his own expense.

The area for which the Board is responsible is only the area of excavation authorized by the Engineer in each block of sewer, drain or water main (see "MEASUREMENTS, UNITS, PAYMENTS" in Sections E, D and F of the General Specifications and possible modifications of these provisions in the Special Specifications), the Contractor is fully responsible for all damage done to surfaces outside this specified area and must restore such surfaces to good condition and so maintain them at his own expense. Each city block will be treated as a unit.

Such surfaces as are described in this paragraph No. 26 are known as "partially improved surfaces"; all partially improved surfaces shall be maintained as specified just above until the end of the maintenance period mentioned in paragraph No. 63 in Section A of the General Specifications.

(27) If the Engineer shall decide that traffic or other conditions make it desirable that an application of oil should be made to the shell surface of a cut in an unimproved street or in a partially improved street on which oil had not previously been placed he may order the new surfacing to be oiled in such manner as he desires. The cost of the oil and its application according to his directions will be paid as Extra Work.

(28) If the Engineer shall decide that it is desirable that a coating of asphalt, frequently called "Blacktop," should be placed on the shell surface of a cut in a partially improved street on which blacktopping had not previously been placed he may order the blacktopping placed in such manner as he desires and it will be paid for, in place, spread and rolled, as Extra Work.

CUTTING AND REPLACING BLACKTOP ROADWAY SURFACE

(29) Blacktop roadway which has been cut or broken in the course of the work shall be restored by the Contractor as follows:

The sand bedding and wrapping used below and above the sewer, the drain or the water pipe shall be thoroughly tamped. Filling above the sand wrapping shall be selected excavated material or, on order of the Engineer, it shall be river sand or lake sand; this filling, well compacted shall be brought up to ten (10) inches below the under side of the adjoining, undisturbed blacktop surfacing, this shall be done as the backfilling of the trench progresses.

Before barricades are removed, before traffic is allowed to bear on the edges of the cut, the trench shall be widened nine (9) inches on each side beyond the authorized width of the trench; this widening shall be to a depth of ten (10) inches below the underside of the adjoining, undisturbed blacktopping. If the filling of the trench has been of the excavated material, decking to the full width of the trench shall be placed over the whole trench surface. If the filling has been with sand the Engineer will decide whether or not the decking shall be used.

Dead reef shells shall then be placed in the widened area filling it to the undisturbed street surface. The Contractor shall maintain this shell surface in good condition, suitable for traffic, until the Engineer shall order the blacktop surface to be placed; this will ordinarily be not less than thirty (30) days nor more than sixty (60) days after the completion of the backfilling of the trench between two consecutive manholes.

When the order for repavement is given the Contractor shall within ten (10) days (due allowance will be made for bad weather) trim the shells down to the under side of the undisturbed blacktop (at the same time cutting back any broken or depressed blacktopping) and filling the cavity with dead reef shells up to the proper grade for the under side of the blacktop surface. He shall then place the new blacktop surface course flush with the undisturbed surface.

All the materials used and the method of their installation shall be the same as those employed by the City Department making street improvements of a similar nature.

The thickness of the blacktop course laid by the Contractor shall not anywhere be less than two (2) inches; shells must be removed, if necessary, to provide the two (2) inch thickness.

The measurement for payment will be for the full length of the trench and for the authorized trench width plus nine (9) inches on each side.

Payment for all this work and all the materials, in place, except for the decking, will be made at the price per square yard bid for cutting and replacing blacktop pavement. Payment for decking used will be at the price bid for decking.

Any repairs to this surfacing, any part or all, that, in the opinion of the Engineer, becomes necessary before the end of the maintenance period must be made at the Contractor's expense.

CUTTING AND REPLACING SURFACES IN PAVED STREETS

(30) Roadway surfaces that have been paved with concrete, either plain or reinforced, or with asphalt or similar material, vitrified bricks, granite blocks or any other surfacing material laid on a concrete base or that have been paved with asphalt, etc., vitrified bricks, etc., laid on a substantial base course of material, other than concrete, are covered by the term "paved surfaces". Sidewalk or driveway surfaces of concrete or reinforced concrete, either monolithic or divided into blocks, or of flagstones, bricks or any other hard paving substance are included in the term "paved surfaces". The Engineer will determine, where there is any doubt, under which classification any roadway or sidewalk or driveway surface is to be placed.

(31) The Board will specify in each contract whether restoration of pavement cut or broken in the course of the work of the contract will be an obligation of the Contractor or whether such pavement will be restored by other forces. Paragraphs Nos. 32-46, both included, govern the cutting and restoration of the pavement by the Contractor; paragraphs Nos. 47-49, both included, govern cutting of the pavement by the Contractor and its restoration by other forces.

(32) If the Contractor is to replace the pavement the cost of cutting it out must be included in the price bid for cutting and restoring pavement of each class.

(33) In the replacement of all pavements the material and workmanship shall be in conformity with the original specifications for the pavement that has been disturbed unless the said original specifications shall be obsolete in which case the materials and workmanship shall be in conformity with the current practices of the City of New Orleans. Except, however, that (a) High Early Strength Cement shall be used wherever cement is required for repaving cuts in street intersections and across roadways, and (b) welded steel fabric or expanded metal shall be used as reinforcement in all such cuts, the said reinforcement to weigh not less than 75 pounds per 100 square feet. The prices bid per square yard for restoration of pavements shall include the cost of the steel reinforcement and the additional cost of High Early Strength Cement referred to just above.

(34) In bidding on pavements made up of two or more courses all the courses shall be considered as integral parts of the pavement; the price bid shall be for replacement of the pavement complete, including foundation, intermediate course (if present) and surface.

(35) Roadway pavement of concrete or of a surface course with a concrete base shall be repaved as shown in Drawing No. 4742-G-2. Such pavement cut by the Contractor in making excavations will be paid for, at the prices per square yard bid for pavements of the various types, up to the width of excavation authorized by the Engineer but pavement that cracks or settles beyond the edges of these authorized cuts must be restored by the Contractor at his own expense. The bid price must include the undercutting, the furnishing and placing of the additional concrete needed for repaving according to Drawing No. 4742-G-2, the steel reinforcement and the use of High Early Strength Cement as indicated in the said drawing. The Engineer may require concrete pavements to be cut back beyond the edges of the cuts to nearby expansion joints; such additional pavement will be paid for at the price bid for cutting and replacing pavement. The materials for the expansion joint will be paid for as Extra Work.

(36) The Contractor shall not make any continuous open cut more than twenty (20) feet in length through any concrete roadway pavement or roadway pavement with a concrete base except with the specific consent of the Engineer, braces of undisturbed pavement not less than two (2) feet in width shall be left across the trench at such intervals as the Engineer may direct. These braces shall remain undisturbed until the Contractor is ready to repave the cut. They shall then be removed and the concrete base shall be replaced as a monolith over the entire area of the cut. This paragraph applies also to cuts large areas of driveways or other concrete pavement in sidewalk areas as well as in roadways.

(37) In replacing vitrified brick, small granite block or creosoted wood block pavement, no brick or block which has been broken or chipped will be permitted to be replaced. All bricks or blocks, before being re-used, must be thoroughly cleaned of all cement or pitch. The Contractor shall supply all deficiencies, the cost thereof shall be included in the price bid for each pavement.

(38) The area of concrete or concrete-base roadway pavement that will be paid for at the price bid per square yard is specified in paragraph No. 35, above, and shown in Drawing No. 4742-G-2. Artificial stone, flagging or any concrete pavement which is cut or divided into blocks or stones shall be replaced as whole stones; any stones cut in the course of the work shall be removed entirely and replaced entirely; the area actually replaced will be paid for at the price bid per square yard, except that stones unnecessarily cut or broken shall be replaced at the Contractor's expense. The large heavy blocks forming driveways, etc., may be excepted from these requirements, however; the Engineer may, at his discretion, order the edges of trenches cut through such stones to be neatly trimmed and portions of stones to be replaced. The area repaved will be paid for at the price bid per square yard, the cost of trimming will be paid for as Extra Work.

(39) Where it is necessary to remove and replace curbs or gutter bottoms which cross the excavation these items will be paid for per linear foot measured along the curb or gutter bottom for the authorized width of the excavation. If a joint in the curb or gutter bottom is so close to the trench as to make it advisable, in the opinion of the Engineer, to take out the curb, etc. to the joint the measurement will be extended to the joint. All of the applicable requirements of these specifications concerning restoration and maintenance of pavement apply also to curbing and gutter bottoms.

(40) Should the street or sidewalk pavements, curbs, gutters, culverts, etc., outside the limits specified above, be damaged, cracked, settled, or disturbed, or injured in any manner by the work of the Contractor, such damage or injury must be repaired and made good and such pavements, gutters, etc., restored to their former condition by the Contractor without direct compensation therefor. Damages caused by the Contractor's equipment shall be considered as damage to be repaired under the terms of this paragraph. The provisions of this paragraph No. 40 apply to unimproved surfaces and partially improved surfaces as well as to paved surfaces.

(41) Pavements having a concrete base must be restored in not less than one (1) month nor more than two (2) months from the time the backfilling of the trench is completed, except by permission or direction of the Engineer. Cuts in unimproved roadways, partially improved roadways or sidewalks not having a concrete base must be restored within one (1) month from the time the backfilling of the trench is completed unless the Engineer shall consider that further delay is desirable.

(42) The Sewerage and Water Board will relieve the Contractor of all obligations to secure permits from the City Engineer's Office for the cutting and restoration of streets and sidewalks, paved or unpaved. The Contractor must, however, observe the requirements of City Ordinance No. 13,927 C.C.S. as to the temporary planking of cuts in paved streets and sidewalks pending the restoration of the pavements.

(43) Should the Contractor neglect to put an adequate force to work on any surface restoration within twenty-four (24) hours after written notice to do so the Engineer may execute the work of restoring the surface at the expense of the Contractor whether it be an unimproved surface, a partially improved surface or a paved surface, deducting the cost thereof from money due or to become due the Contractor. Such action by the Engineer shall not relieve the Contractor from any responsibility for maintenance of surfaces so restored.

(44) When the Contractor has restored the surface (whether it be "unimproved", "partially improved" or "paved") over one whole "block" of his excavation it will be inspected and if it is found to be satisfactory it will be included for payment in the monthly estimate. All restored surfaces shall be maintained by the Contractor in good condition until the end of the maintenance period mentioned in paragraph No. 63 in Section A of the General Specifications.

(45) As soon as the roadway or sidewalk which was disturbed by the Contractor has been repaired, all refuse or surplus material deposited or left by the Contractor on the street shall be removed therefrom and the street restored in all respects to as good a condition as before the trenching was commenced.

(46) In case any pavement cut or broken by the Contractor in the course of his contract is still under maintenance by the paving contractor who laid the pavement in the first place, the Contractor on this contract shall make an arrangement with the said paving contractor for the restoration of the said cut or broken pavement, either restoration by the original paving contractor under the terms of his contract for laying the pavement or restoration by the Contractor on this contract with the written consent of the paving contractor which written consent shall include a clause releasing the Contractor on this contract and the Board from any responsibility for further maintenance obligations. The responsibility of determining the maintenance status of pavements rests on the Contractor, the Board will pay only the price bid per square yard for pavement of each class.

(47) If the pavement is to be restored by forces other than those of the Contractor the cost of cutting out the pavement must be included in the prices bid for laying the sewer, the drain, the water main, etc.

(48) The Contractor must restrict his excavations to the limits set by the Engineer in each case, he must also observe the requirements of paragraphs Nos. 35 and 36, above. Any pavement, curbing, gutter bottom or other surface improvement unnecessarily broken by the Contractor, cut in excess of the Engineer's directions or cracked, settled, displaced or otherwise damaged by or in course of the work of this contract must be replaced at the cost of the Contractor. The last two sentences in paragraph No. 40, above, apply also to contracts under which restoration of surfaces is to be done by forces other than those of the Contractor.

(49) The Contractor shall consolidate the backfilling in his excavations as required by the Engineer so that the cuts may be repaved within the time limits set in paragraph No. 41, above. At any time prior to repaving the Engineer may call on the Contractor to make temporary repairs over these cuts as required in paragraph No. 25 for unimproved surfaces.

DECKING UNDER SURFACING MATERIALS

(50) Where the Engineer shall require it the Contractor shall place wood decking in partially backfilled trenches at such depths below the surface as the Engineer deems best, so as to form a separation between the backfilling and the paving or the surfacing material. This decking shall be of low grade lumber of one (1) inch thickness and not less than five (5) inches in width, it must be capable of serving the purpose for which it is ordered; it will be paid for at the price bid per square foot for decking under surfacing material, except where it is specifically stated that the cost of decking is included in the price of some other item.

**GENERAL SPECIFICATIONS
SECTION C
MATERIALS**

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ROUND PILING

(1) Untreated piles shall be rough peeled, Class B, pine Douglas Fir, or cypress and shall conform to the "Standard Specifications for Round Timber Piles, A.S.T.M. Designation D 25", with the following exception:

(2) Piles 40 feet and shorter shall be allowed a variation of plus or minus 3 inches in lieu of the 1 foot specified. Piles longer than 40 feet shall be allowed a variation of plus or minus 6 inches in lieu of the 2 feet specified.

(3) The A.S.T.M. Specification permits 10% of the piles to have circumferences 2 inches less than the tabulated minimum values. However, the Board requires all piles to conform to the tabulated minimum values of the specifications and the actual length of the pile clearly marked with paint on the butt end.

CREOSOTED PILES, TIMBER AND LUMBER

(4) Treated piles shall be pine, clean-peeled conforming to the specifications and exceptions thereto stated above.

(5) Creosoted piles and timber shall conform to A.S.T.M. Resignation D-25, Class "B", as amended for treated piles. Southern Yellow Pine piles and treated timber shall be conditioned and treated in accordance with American Wood Preserver's Association "Standard Specifications for Preservative Treatments by Pressure Process T1-49" as supplemented by "Standard Specification for Treatment of Piles T3-49", published in the A.W.P.A. "Manual of Recommended Practice." The treatment and preservative shall be full-cell, 12 pound creosote A.W.P.A. Specifications P1-49, Grade 1. The maximum pressure shall be 175 pounds, and the minimum penetration shall be 7/8" or 100% sap wood.

STORAGE AND HANDLING OF PILES

(6) The A.W.P.A. Standard M4-54 "Instructions for the Care of Pressure-Treated Wood After Treatment" shall be adhered to.

CEMENT

(7) All cement must be true Portland cement, made, stored and tested in accordance with the latest current A.S.T.M. Specifications for Portland Cement, Designation C150, Type I through Type V as specified, unless otherwise specified Type I cement shall be used for general concrete and for mortar, Type III shall be used when high early strength is required.

(8) Cement must be of brands which have been in general use for a sufficient length of time to be generally known; the Contractor shall advise the Engineer what brand he intends to use well in advance of purchase and the Engineer shall have the right to refuse to allow the use of any brands that he may deem unfit or undesirable.

(9) Cement shall be in perfect condition when brought to the site of the work and thereafter it shall be stored in weather-proof shelters, so that the cement shall be protected from dampness. Satisfactory certification of the manufacturer's brand shall be furnished with each quantity delivered.

SAND

(10) Sand used for mortar shall be of the type known locally as Lake Shore Sand. It shall be of the best quality, of the coarser grains found near the source of the sand and shall be clean free from dirt or other foreign matter.

(11) Sand used for concrete shall be clean Concrete Sand of approximately the following sieve specification, namely:

Sieve	% Passing (cumulative)
3/8"	100
No. 4	95-100
No. 16	55-90
No. 50	5-30
No. 100	0-7

The fineness modulus of the sand shall be between 2.50 and 3.10.

GRAVEL, ETC.

(12) Coarse aggregate may be gravel or crushed stone; it shall be composed of clean, sound, durable particles reasonably free from soft, friable, thin, elongated or laminated pieces and shall contain no alkali or organic matter. The amount of deleterious substances shall not exceed the following percentages by weight:

Removed by washing	1.0%
Soft fragments	6.0%
Clay	0.5%

(13) Coarse aggregate shall be uniformly graded from coarse to fine and when tested by laboratory sieves with square openings shall meet the following gradation requirements, percentages by weights:

Sieve	% Passing
1"	90-100
3/4"	40-85
1/2"	25-60
No. 4	0-10

Coarse aggregate from any one source varying more than .20 either way in fineness modulus will not be considered as uniformly graded; it shall be either rejected or stored separately to permit such an adjustment in mix of concrete as may be necessary.

WATER

(14) The water used for making mortar or concrete shall be from the City mains. The Contractor shall comply with all the requirements of the Sewerage and Water Board concerning arrangements for supply and payment for the water.

MORTAR

(15) The mortar of standard Sewerage and Water Board practice consists of Portland Cement and mortar-sand in proportions specified for each class of service. The cement and the aggregate, in the proportions designated for specific purposes, shall be thoroughly mixed dry and the proper amount of water then added.

(16) If the Contractor wishes to use either cement-mortar tempered with lime or a commercial mortar-mix he must submit samples to the Engineer, if tests prove them satisfactory their use will be allowed.

(17) The proper consistency of the mortar for various uses will be determined by the Engineer. Retempering mortar which has partially hardened, that is remixing it with or without additional materials or water, will not be permitted.

CONCRETE**GENERAL REQUIREMENTS**

(18) In general the A.C.I. Building Code Requirements for Reinforced Concrete (A.C.I. 318) shall apply in all matters pertaining to the applicable A.S.T.M. Specifications for the materials and testing of the concrete. The A.C.I. Specification shall also apply regarding the quality, allowable stresses, mixing, placing and other details of concrete construction that are not covered or contradicted by these General Specifications or specifically mentioned in the Special Specifications.

(19) In addition to the above the following A.C.I. Specifications shall apply if applicable to this contract:

- A.C.I. 319 — Recommended Practice for the use of Metal Supports for Reinforcement
- A.C.I. 613 — Recommended Practice for Selecting Proportions for Concrete
- A.C.I. 614 — Recommended Practice for Measuring, Mixing and Placing Concrete
- A.C.I. 616 — Recommended Practice for the Application of Portland Cement Paint to Concrete Surfaces
- A.C.I. 805 — Recommended Practice for the Application of Mortar by Pneumatic Pressure

GRADES

(20) Concrete of various strengths are to be known as Grades A-A-1, A-A, A, B, C, and D; the components and slumps shall be as follows:

Grade	Comp. Strength at 28 days Lbs. per sq. in.	Min. Sacks per cu. yd. conc.	Max. Water per Sack	Max. Slump
A-A-1	3750	6.0	6	4.5"
A-A	3500	6.0	6	5"
A	3000	5.5	6	6"
B	2500	5.0	7	6"
C	2000	4.5	8	6"
D	1500	3.75	9	3"

(21) The quantities of cement per cu. yd. of concrete specified just above are for concrete without admixtures; if admixtures approved by the Engineer are permitted the compression strengths required in this tabulation shall govern the quantities of cement to be used.

(22) The Board, at its option, will test the concrete for compliance with the strength requirements by means of specimens secured and tested in accordance with the latest A. S. T. M. specification on these subjects.

PROPORTIONS

(23) The proportions of the aggregates to the cement shall be such as will work readily into the corners and angles of the forms and around and between the reinforcement without excessive spading.

(24) For determining the proportions of concrete one sack of cement weighing ninety-four (94) pounds, net, shall be considered as one cubic foot. The aggregate shall be measured accurately by means of bottomless boxes of known volume or by some other device approved by the Engineer; proportioning by shovelfuls will not be permitted.

(25) The quantity of water shall be measured by a tank with a graduated scale with a quick-closing outlet valve or by some other device satisfactory to the Engineer. The water measuring device shall be controlled from a cabinet which can be kept locked and shall be so constructed that water can be discharged only while the mixer is in operation.

MIXING

(26) In handling and measuring the materials for the concrete, including the water, methods must be used which will ensure complete separation of the various ingredients until they are brought together in the mixer. Cement shall be emptied directly from the bags or from accurate scales into the charging skip.

(27) The mixing of the concrete shall be done in a batch machine mixer of an approved type which will ensure a uniform distribution of the materials through the mass so that the mixture is homogeneous and is uniform in color. The batch shall be so charged into the mixer that some water shall enter in advance of the cement and the aggregates but while the mixer is rotating. The dry materials and the rest of the water shall then enter and the required period of mixing shall then begin. Provision shall be made to ensure that the concrete shall not be discharged until the full time required for the mixing has elapsed. Mixing shall continue for at least one full minute after all the materials are in the mixer for a mixer of one cubic yard capacity; for mixers of great capacity the mixing time shall be extended one-quarter minute for each additional cubic yard of fraction thereof. The mixer shall be rotated at the rate recommended by the manufacturer. The Engineer has the right to require that the mixer be equipped with an automatic attachment for keeping the discharging lever locked until the required mixing period has elapsed.

(28) The volume of the mixed material in one batch shall not exceed the rated capacity of the machine. The entire contents of the mixer shall be discharged before fresh materials for a new batch are put in. The mixer must be cleaned at frequent intervals while in use. Retempering of concrete which has partially hardened, that is, remixing it with or without additional materials or water, will not be permitted.

READY MIXED CONCRETE

(29) Ready mixed concrete delivered at the job, ready for use, may be used by the Contractor. Ready mixed concrete shall conform in all respects to the provisions of paragraph Nos. 18-28, just above, both included, except as may be otherwise specified below.

(30) When the central mixing plant is depended upon for complete mixing the method of mixing and the minimum mixing time shall be as described in paragraph No. 27, just above.

(31) When the concrete is transported in an agitator provided with mixing blades, the mixing time at the central plant may be reduced to the minimum time required to incorporate the ingredients of the mixture into a mass and the mixing may be completed in the agitator; under these circumstances all ingredients for a batch shall be in

the mixer and properly incorporated before any concrete is discharged into the agitator and each batch shall be mixed in the agitator for fifty (50) revolutions or more. The size of the batch shall not exceed the rated capacity of the agitator.

(32) In the case of truck mixing, the size of the batch shall not exceed the rated capacity of the mixer; the mixer shall be water tight when closed. Each batch of concrete shall be mixed not less than 50 or more than 150 revolutions of the mixer at the rate of rotation specified by the manufacturer as the mixing speed; any additional mixing shall be done at a slower speed specified by the manufacturer for agitation. The truck mixer shall be equipped with a tank for carrying the mixing water, the water shall be measured and placed in the tank at the proportioning plant unless the tank is equipped with an automatic measuring device of the required accuracy and capable of being locked. The mixing water may be added directly to the batch except as limited by the provisions of the following paragraph.

(33) Concrete shall be delivered to the site of the work and discharge from the hauling container shall begin within one-half (½) hour after the introduction of the mixing water to the dry materials or after the introduction of the cement to the aggregate if the sand contains surface moisture in excess of six (6) per cent by weight or if the gravel contains surface moisture in excess of three (3) per cent by weight.

(34) All ready mixed concrete shall be hauled in water tight containers in which segregation shall not take place and from which the concrete can be discharged freely; it shall be delivered to the work at the specified consistency. Proportioning, mixing and delivery of ready mixed concrete shall be inspected by a testing laboratory of recognized standing to be appointed by the Board, if required by the Engineer.

CEMENT BLOCKS

(35) Cement blocks for support of steel reinforcing are to be made of 1 part cement to 2½ parts of sand, or may be cast with concrete having the "same properties" and strength as that of the concrete that the blocks are to be used with. The blocks shall be accurately cast in size.

METAL REINFORCEMENT FOR CONCRETE

(36) The steel reinforcing here for the concrete shall be Billet Steel, Intermediate Grade or Structural Grade, in accordance with the current A.S.T.M., A-15, or Rail Steel in accordance with the current A.S.T.M., A-16; column ties shall conform to A.S.T.M., A-15, A-16, or to A-82.

(37) Reinforcing bars above ¼" shall be deformed bars and shall conform to the requirements of the current A.S.T.M. A-305 "Tentative Specifications for Minimum Requirements for the Deformation of Deformed Steel Bars for Concrete Reinforcement".

(38) The reinforcement shall be accurately bent cold in the shop to shapes indicated on the plans and with tolerances not to exceed those specified in the manual of Standard Practice of the American Concrete Institute (ACI 315).

WELDED WIRE FABRIC

(39) Welded wire fabric shall meet the requirement of the prevailing standards for Welded Steel Wire Fabric for concrete reinforcement required by the latest current A.S.T.M. Specifications Designation A-185. It shall weigh 77 lbs. per 100 sq. ft. Longitudinal wire spacing shall be 6 inches and wire size No. O, W & M standard gauge. The transverse wire spacing shall be 12 inches and wire size No. 1 W & M standard gauge.

STRUCTURAL STEEL

(40) Structural Steel shall conform to the Standard Specifications for Structural Steel for Bridges and Buildings required by the latest current A.S.T.M. Specifications Designation A-7.

BOLTS AND NUTS

(41) All machine bolts, studs, nuts and anchor bolts shall be in conformity with the requirements of the current Tentative Specifications for "Steel Machine Bolts and Nuts and Tap Bolts", A.S.T.M. Designation A-307, Grade "A"; specification requires American National form right hand machine cut threads, Class 2 fit.

(42) Bolt heads and nuts shall be semi-finished hexagonal and in conformity with the dimensions of the current American Standard Specification for "Wrench Head Bolts and Nuts and Wrench Openings", Heavy Series, A.S.A., B18.2.

BRICKS

(43) Bricks used in the construction of manholes, etc., shall be burned clay bricks of standard sewer brick size, namely, approximately eight (8) inches by three and three-quarters (3¾) inches by two and one-quarter (2¼) inches, except as allowed below in paragraph No. 45. They shall have an average compressive strength, flatwise, of not less than 2500 lbs. per sq. in., they shall withstand an average transverse load, applied at the center, of not less than 815 lbs. when laid flatwise on supports seven (7) inches apart. The absorption of a dry brick boiled in water for five (5) hours shall not be more than seventeen (17) per cent nor less than twelve (12) per cent of the weight of the dry brick.

(44) Bricks of other material than burned clay will not be allowed except by special permission of the Engineer; if allowed at all their use will be permitted only if, in addition to their ability to withstand the tests already specified, satisfactory evidence is produced that they can resist the effects of weather, wear and chemicals, they must also be readily cut with a trowel to such shapes as may be needed. The absorption of a brick of cement or concrete as determined by the test described above in Paragraph No. 43, shall not be more than eight (8) per cent of the weight of the dry brick; the finish and the texture of all bricks must be such as will provide a good bond between the brick and the mortar.

(45) If the Contractor desires to make use of radial bricks, either solid or hollow, he will be permitted to use them provided they meet the required strength in compressive tests in all three directions and also stand the absorption test. Radial bricks must have a radial length of at least eight (8) inches for use in a "one brick" wall and a length of at least twelve (12) inches for use in a "brick-and-a-half" wall. Perforated bricks may be used in walls of manholes, catch-basins, etc., subject to restrictions in the specifications for sewerage, drainage and water construction in Sections D, E and F. The contractor may use double bricks, common, perforated. The brick shall have a size

of approximately eight (8) inches by three and three quarters (3¾) inches by four and one-half (4½) inches. The bricks shall have an allowable compressive strength of five thousand (5000) p.s.i. with the height in compression. The absorption of a dry brick boiled in water for five (5) hours shall not be more than seventeen (17) per cent nor less than twelve (12) per cent of the weight of the dry brick. The brick shall be laid in position so that the perforations will be vertical, the perforations being parallel with the height of the brick.

MANHOLE STEPS

(46) Manhole steps shall be of genuine wrought iron or aluminum, shaped according to the drawing No. 6071-B-6. The wrought iron shall conform to A.S.T.M. specifications A-207.

MISCELLANEOUS IRON CASTINGS

(47) Castings for manhole frames or covers, catch-basins, handholes, cleanouts, culvert plates, valve boxes and all other iron castings required for the work embraced in this contract shall be of tough gray iron, free from all injurious defects and of such quality that a blow from a hammer on a square edge will produce an indentation of the casting without flaking the metal; when broken the faces shall show a fine grain, gray fracture.

(48) Plugging of defects will not be permitted. Castings must be wire brushed until clean. No coating, dipping or painting of castings will be allowed. They shall be of the designs, dimensions and weights shown in the drawings; a variation of more than five (5) per cent from the weights shown in the drawings will not be permitted. All castings shall be made accurately to the dimensions specified and shall be planed where marked or where otherwise necessary to secure perfectly flat and true surfaces; allowance shall be made in the patterns so that the thickness shall not be reduced by the planing. Covers must fit the frames in any position. Patterns for iron castings will not be furnished by the Board, their cost must be included in the prices bid for manholes, etc.

SHEET METAL

(49) Sheet metal shall be galvanized sheet iron in accordance with A.S.M.T. A-93.

GALVANIZING

(50) All items to be galvanized are to be hot dipped in accordance with the requirements of the current applicable A.S.T.M. Specification.

CLAM SHELLS

(51) Clam shells to be used as foundation or bedding of sewer, drain or water pipe or as temporary surfacing for roadways and sidewalks, shall be the small dead shells known locally as "clam shells". They may be bank run, ranging in size, approximately, from one-half inch to one and one-half inches with much finely broken shells included but they must be free from sand, clay or other foreign matter.

REEF SHELLS

(52) Reef shells, the dead oyster shells from shell banks, ordinarily used for bedding for pipes or for temporary surfacing of roadways and sidewalks, shall be free from excess of sand, clay or other foreign matter. Finely broken shells are acceptable.

(53) DELETED

DRAIN PIPE JOINTING MATERIAL

(54) All Storm Drain Pipe of diameters forty-eight (48) inches and under shall be of the Bell and Spigot Type. Rubber coupling joints conforming to the latest A.S.T.M. Specifications C-443 or Ram-Nek cold applied preformed Plastic Gaskets or equal may be used with the provision that the Contractor shall furnish the Engineer the Manufacturer's Certificate of Analysis.

All Storm Drain Pipes of fifty-four (54) inches and over including all sizes of Arch Type Pipe shall be joined with either Rubber Gaskets, as above, or Ram-Nek cold applied preformed Plastic Gaskets or equal. This cold applied preformed Plastic jointing material shall conform to the latest Federal Specifications SS-S-00210 (GSA-FSS).

LEAD

(55) The material used for making joints in cast iron water mains, and ordinarily in cast iron sewers or drains, shall be soft, pure pig lead.

VITRIFIED CLAY PIPE FOR SEWERS AND DRAINS

(56) Except as hereinafter specified clay pipe shall conform to the latest current specifications of the A.S.T.M. Designated C-13 (Standard Strength Clay Pipe), for 6" pipes and Designation C-200 (Extra Strength Clay Pipe) for pipes of 8" diameter and larger.

(57) Whenever Vitrified Clay Pipe is specified with joints using materials having resilient properties, it shall be extra strength clay pipe conforming to the latest current specifications of the A.S.T.M. Designation C-425.

(58) Sub-paragraph (b) of Paragraph No. 14 (A.S.T.M. Designation C-200-59T) headed "Rejection", which reads as follows, is deleted:

"Fractures or cracks passing through the barrel or socket, except that a single crack at the spigot end of the pipe not exceeding 75 per cent of the depth of the socket, or a single fracture in the socket not exceeding three (3) inches around the circumference nor two (2) inches lengthwise may be permitted".

(59) Pipe will be rejected for fire cracks or hair cracks sufficient to impair the strength, durability, or serviceability of the pipe. Any pipe delivered with a crack of any length and of such depth that a thin knife blade can be inserted more than ¼ inch into the pipe will be rejected. The Contractor must furnish a certificate from the manufacturer that the pipe furnished by him does conform thereto and to the requirements of these specifications and that it has been tested according to the said A.S.T.M. specifications by a testing laboratory of recognized standing. Wherever the word "pipe" is used in these specifications for vitrified clay pipe it shall be interpreted as also referring to T's, Y's, and other fittings, unless the shape of the fitting shall make the matter plainly inapplicable. Each pipe approved by the said testing laboratory shall be plainly marked by the inspector with the mark of the laboratory. The cost of all inspection and testing must be included in the price bid for clay pipe sewer laid.

(60) Glazing shall not cover the inner surface of the socket nor the outer surface of the spigot end for a distance from the end of the pipe equal to the specified depth of the socket. The interior of the socket and the exterior of the spigot near its end shall both be scored with three parallel scratches about 1/8" deep running completely around the pipe.

(61) Clay pipes shall be of dimensions and physical qualifications as follows:

Internal Diameter, Inches	Approx. Laying Length, Feet	Thickness of Barrel, Inches		Dimensions of Socket Inches				Min. Strength Three Edge Bearing Test, Lbs. per L.F.		Max. Absorption Per Cent
				Annular Space Near Base of Socket		Depth		C-13	C-200	
				C-13	C-200	C-13	C-200			
6	2-1/2-4	5/8	—	9/16	—	2-1/4	—	1000	—	8
8	3-5		7/8		3/4		2-1/2		2000	8
10	3-5		1		3/4		2-5/8		2000	8
12	3-5		1-3/16		13/16		2-3/4		2500	8
15	4-5		1-1/2		13/16		2-7/8		2750	8
18	4-6		1-7/8		13/16		3		3300	8
21	4-5		2-1/4		7/8		3-1/4		3850	8
24	4-5		2-1/2		7/8		3-3/8		4400	8
*27	4-5		2-3/4		7/8		3-1/2		4700	8
*30	4-5		3		7/8		3-5/8		5000	8
*33	4-5		3-1/4		1		3-3/4		5500	8
36	4-5		3-1/2		1		4		6000	8

T's and Y's shall be the same dimensions as straight pipe for each size, however, no Y's or T's will be required in diameter greater than 21".

*These are not standard diameters but they are useful sizes and every effort to secure them must be made if they are called for in the Form of Proposal.

(62) In addition to the laboratory tests all clay pipes and fittings will be subjected to a rigid inspection after delivery on the site of the work and just before being laid in the trench and those found to be defective in any way will be rejected and must be removed from the work.

NON-REINFORCED CONCRETE PIPE FOR SEWERS AND DRAINS

(63) Except as hereinafter specified concrete pipe shall conform to the latest current specifications of the A.S.T.M. for Concrete Sewer Pipe, Designation C-14 and the Contractor must furnish a certificate from the manufacturer that the pipe furnished by him does conform thereto and to the requirements of these specifications and that it has been tested according to the said A.S.T.M. specifications by a testing laboratory of recognized standing. Wherever the word "pipe" is used in these specifications for concrete pipe it shall be interpreted as also referring to T's, Y's and other fittings unless the shape of the fitting shall make the matter plainly inapplicable. Each pipe approved by the said testing laboratory shall be clearly stamped with the mark of the laboratory. The cost of all inspection and testing must be included in the prices bid for concrete pipe sewers and drains laid.

(64) Curing processes shall be adapted to the climate of the locality where the pipe is manufactured and shall be subject to the approval of the Engineer. When those processes that give the best results have been determined they shall be followed strictly.

(65) Non-reinforced concrete pipes for use as Sewers and Drains shall be of the Bell and Spigot Type with dimensions and physical qualification as follows:

A.S.T.M. C-14

Internal Diameter Inches	Minimum Laying Length Feet	Minimum Thickness of Barrel, Inches	Minimum Strength Three Edge Bearing Test Lbs./L.S.	Minimum Dimensions of Socket, Inches		Maximum Absorption, Per Cent
				Annular Space at Mouth of Socket	Depth	
6	2-1/2	5/8	1100	1/2	2	8
8	3	3/4	1300	5/8	2-1/4	8
10	3	7/8	1400	5/8	2-1/2	8
12	4	1	1500	5/8	2-1/2	8
15	4	1-1/4	1750	5/8	2-1/2	8
18	4	1-1/2	2000	5/8	2-3/4	8
21	4	1-3/4	2200	3/4	2-3/4	8

(66) It shall not be necessary in specifications for sewerage or drainage construction to specify that concrete pipe must conform to the specifications for "concrete pipe for sewers or drains"; the fact that the contract is sewerage or drainage construction is sufficient notice to the bidder that pipe of this class is to be furnished.

(67) In addition to the laboratory tests all concrete pipe and fittings will be subjected to a rigid inspection after delivery on the site of the work and just before being laid in the trench and those found to be defective in any way will be rejected and must be removed from the work.

REINFORCED CONCRETE PIPE FOR SEWERS

(68) Except as hereinafter specified reinforced concrete pipe for use as sewers shall conform to the latest current specifications of the A.S.T.M. for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, Designation C-76 Table III and the Contractor must furnish a certificate from the manufacturer that the pipe furnished by him does conform thereto and to the requirements of these specifications and that it has been tested according to said A.S.T.M. Specifications by a testing laboratory of recognized standing. Wherever the word "pipe" is used in these specifications for reinforced-concrete pipe it shall be interpreted as referring also to Y branches and T branches. Each pipe approved by the said testing laboratory shall be clearly stamped with the mark of the laboratory. The cost of all inspection and testing shall be included in the prices bid for reinforced concrete pipe sewers laid.

(69) Paragraph (64) above shall apply.

(70) Reinforced Concrete Pipes for Sewers shall be the Bell and Spigot Type through 48" diameter and of the Tongue and Groove Type in diameters above 48" with dimensions and strengths as follows:

ASTM C-76 TABLE III

The strength test requirements in pounds per linear foot of pipe under the three-edge bearing method shall be the D-load (test load expressed in pounds per linear foot per foot of diameter) to produce a 0.01 in. crack, and the ultimate load as specified below, multiplied by the internal diameter of the pipe in feet.

D-load to produce a 0.01 in. crack	1350
D-load to produce the ultimate load	2000

Internal Diameter (Inches)	Laying Length (Feet)	Minimum Dimensions of Socket, Inches		Minimum Reinforcement, sq. in. per linear foot of pipe barrel							
				Wall A				Wall B			
				Concrete Strength, 4000 psi				Concrete Strength, 4000 psi			
				Annular Space at Mouth of Socket	Depth	Minimum Wall Thickness	Circular Reinforcement		Elliptical Reinforcement	Minimum Wall Thickness	Circular Reinforcement
Inner Cage	Outer Cage	Inner Cage	Outer Cage								
12"	4'6"	5/8	2-1/4	1-3/4	0.08	—	—	3	0.07	—	—
15"	4'6"	5/8	2-1/2	1-7/8	0.09	—	—	2-1/4	0.08	—	—
18"	4'6"	5/8	2-3/4	2	0.11	—	0.09	2-1/2	0.09	—	0.07
21"	4'6'3"	3/4	2-3/4	2-1/4	0.14	—	0.11	2-3/4	0.12	—	0.09
24"	4'6'3"	3/4	3	2-1/2	0.17	—	0.14	3	0.14	—	0.12
27"	4'8"	3/4	3	2-5/8	0.18	—	0.16	3-1/4	0.16	—	0.14
30"	4'8'10"	3/4	3-1/2	2-3/4	0.19	—	0.18	3-1/2	0.18	—	0.15
36"	4'8'10"	1	3-1/2	3	0.21	0.16	0.23	4	0.17	0.13	0.19
42"	4'8'10"	1	4	3-1/2	0.25	0.19	0.28	4-1/2	0.21	0.16	0.23
48"	4'8'10"	1	4	4	0.32	0.24	0.35	5	0.24	0.18	0.27
		Groove									
		Min. Depth	Max. Slope								
54"	4'6'3"	4	10°	4-1/2	0.38	0.28	0.42	5-1/2	0.29	0.22	0.32
60"	4'6'3"	4	10°	5	0.44	0.33	0.49	6	0.34	0.26	0.38
66"	4'6'3"	4-1/2	10°	5-1/2	0.50	0.37	0.55	6-1/2	0.41	0.31	0.46
72"	4'6'3"	4-1/2	10°	6	0.57	0.43	0.63	7	0.49	0.37	0.54

(71) It shall not be necessary in specifications for sewerage construction to specify that reinforced concrete pipe must conform to these specifications for "reinforced concrete pipe for sewers"; the fact that the contract is for sewerage construction is sufficient notice to the bidder that pipe of this class is to be furnished.

(72) In addition to the laboratory tests all reinforced concrete pipe and fittings will be subjected to a rigid inspection after delivery on the site of the work and just before being laid in the trench and those found to be defective in any way will be rejected and must be removed from the work.

REINFORCED CONCRETE PIPE FOR DRAINS

(73) Reinforced Concrete Pipe for Drains shall be of the Bell and Spigot Type through 48" diameter and of the Tongue and Groove Type in diameters above 48" and shall conform to the latest current A.S.T.M. Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe Designation C-76 Table II.

(74) All the other requirements of paragraphs (68) and (69) above shall apply to reinforced concrete pipe for use as drains. The dimensions and strengths of reinforced concrete pipes for drains shall be as follows:

ASTM C-76 TABLE II

The strength test requirements in pounds per linear foot of pipe under the three-edge bearing method shall be the D-load (test load expressed in pounds per linear foot per foot of diameter) to produce a 0.01 in. crack, and the ultimate load as specified below, multiplied by the internal diameter of the pipe in feet.

D-load to produce a 0.01 in. crack _____ 1000

D-load to produce the ultimate load _____ 1500

Internal Diameter (Inches)	Laying Length (Feet)	Minimum Dimensions of Socket, Inches		Minimum Reinforcement, sq. in. per linear foot of pipe barrel							
				Wall A				Wall B			
		Annular Space at Mouth of Socket	Depth	Minimum Wall Thickness (In.)	Circular Reinforcement		Elliptical Reinforcement	Minimum Wall Thickness (In.)	Circular Reinforcement		Elliptical Reinforcement
					Inner Cage	Outer Cage			Inner Cage	Outer Cage	
12"	4'6"	5/8	2-1/4	1-3/4	0.07	—	—	2	0.07	—	—
15"	4'6"	5/8	2-1/2	1-7/8	0.07	—	—	2-1/4	0.07	—	—
18"	4'6'8"	5/8	2-3/4	2	0.10	—	0.07	2-1/2	0.07	—	0.07
21"	4'6'8"	3/4	2-3/4	2-1/4	0.12	—	0.10	2-3/4	0.10	—	0.09
24"	4'6'8"	3/4	3	2-1/2	0.13	—	0.11	3	0.11	—	0.10
24"	4'6'8"	3/4	3	2-5/8	0.15	—	0.13	3-1/4	0.13	—	0.11
27"	4'8"	3/4	3	2-5/8	0.15	—	0.14	3-1/2	0.14	—	0.12
36"	4'8'10"	1	3-1/2	3	0.14	0.10	0.15	4	0.12	0.19	0.13
42"	4'8'10"	1	4	3-1/2	0.16	0.12	0.18	4-1/2	0.15	0.12	0.17
48"	4'8'10"	1	4	4	0.21	0.16	0.23	5	0.18	0.14	0.20
		Groove									
		Min. Depth	Max. Slope								
54"	4'6'8"	4	10°	4-1/2	0.25	0.19	0.28	5-1/2	0.22	0.16	0.24
60"	4'6'8"	4	10°	5	0.30	0.22	0.33	6	0.25	0.19	0.28
66"	4'6'8"	4-1/2	10°	5-1/2	0.35	0.26	0.39	6-1/2	0.31	0.23	0.34
72"	4'6'8"	4-1/2	10°	6	0.41	0.30	0.45	7	0.35	0.26	0.39

ELLIPTICAL PIPE

Internal Diameter (Inches)	Laying Length (Feet)	Minimum Wall Thickness	Minimum Cross-Sectional Area of Circular Steel Sq. In. per L.F.		Minimum Strength 3-edge Bearing Test Lbs. per L.F.		Minimum Dimensions of Socket, Inches	
			One Line Only	Two Lines Each	First .01" Crack	Ultimate	Annular Space at Mouth of Socket	Depth
40 x 36	8-10	4	.12	—	3000	4500	1	6
46 x 42	8-10	4	.14	—	3200	4800	1	6
48 x 52-1/4	8-10	4-1/4	.16	—	3400	5100	1	6

ARCH CONCRETE PIPE

D-load to produce a 0.01 in. crack _____ 1350
 D-load to produce the ultimate load _____ 2000

Test Load in Lbs. Per Lineal Foot Equals D-Load x Equiv. Round Diameter in Feet

Round Equivalent	Nominal Size Span & Rise	Laying Length	Minimum Depth of Groove	Minimum Rein., sq. in. per Lineal Ft. Pipe Barrel	
				Concrete Strength — 4000 psi	
				Minimum Wall Thickness, Inches	One Elliptical Line
24"	30" x 18"	6-8	3"	3"	0.15
30"	36" x 23"	6-8	3"	3-1/2"	0.19
36"	44" x 27"	6-8	4"	4"	0.23
42"	51" x 31"	6-8	4"	4-1/2"	0.27
48"	58" x 36"	6-8	5"	5"	0.32
54"	65" x 40"	6-8	5"	5-1/2"	0.38
60"	73" x 45"	6	6"	6"	0.46
72"	88" x 54"	6	6"	7"	0.63

(75) The pipes of 8 to 10 feet lengths must have a lifting hole about 2" in diameter in the top side at the center of gravity of the pipe and a precast concrete plug to close the said hole after the pipe is laid.

(76) It shall not be necessary in specifications for drainage construction to specify that reinforced concrete pipe must conform to these specifications for "reinforced concrete pipe for drains"; the fact that the contract is for drainage construction is sufficient notice to the bidder that pipe of this class is to be furnished.

EXTRA STRENGTH REINFORCED CONCRETE PIPE FOR DRAINS

(77) Where loading or depth conditions require, extra strength reinforced concrete pipe shall be specified and this pipe shall conform to the latest current specifications of the A.S.T.M. for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, Designation C 76 Table III. All other requirements of paragraphs (68), (69) and (73) above shall apply.

(78) The dimensions and strengths of extra strength reinforced concrete pipe for drains shall be as listed in paragraph (70) above.

(79) It shall not be necessary in specifications for drainage construction to specify that extra strength reinforced concrete pipe must conform to these specifications for "extra strength reinforced concrete pipe for drains"; the fact that the contract is for drainage is sufficient notice that pipe of this class is to be furnished.

REINFORCED CONCRETE PIPE FOR JACKING

(80) Pipe for jacking shall be of the Tongue and Groove Type and shall be round. The design, materials, methods of manufacture, curing, inspection and tests of this pipe shall conform to the latest current A.S.T.M. Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe Designation C 76 Table IV.

ASTM C-76 TABLE IV

The strength test requirements in pounds per linear foot of pipe under the three-edge bearing method shall be the D-load (test load expressed in pounds per linear foot per foot of diameter) to produce a 0.01 in. crack and the ultimate load as specified below, multiplied by the internal diameter of the pipe in feet.

D-load to produce a 0.01 in. crack _____ 2000
 D-load to produce the ultimate load _____ 3000

Internal Diameter	Laying Length	Dimensions of Groove		Minimum Reinforcement, sq. in. per linear foot of pipe barrel							
				Wall B				Wall C			
		Minimum Depth (In.)	Maximum Slope (Degrees)	Minimum Wall Thickness (In.)	Concrete Strength, 4000 psi		Concrete Strength, 4000 psi		Minimum Wall Thickness	Concrete Strength, 4000 psi	
					Circular Reinforcement		Elliptical Reinforcement			Circular Reinforcement	
			Inner Cage	Outer Cage			Inner Cage	Outer Cage			
24"	4'8"	3	10	3	0.27	—	0.23	4	0.07	0.07	0.08
27"	4'8"	3	10	3-1/4	0.31	—	0.25	4-1/8	0.08	0.07	0.09
30"	4'8"10'	3	10	3-1/2	0.35	—	0.28	4-1/4	0.09	0.07	0.10
36"	4'8"10'	3	10	4	0.30	0.22	0.33	4-7/8	0.14	0.10	0.15
42"	4'8"10'	4	10	4-1/2	0.35	0.26	0.39	5-1/4	0.20	0.15	0.22
48"	4'8"10'	4	10	5	0.42	0.32	0.47	5-3/4	0.26	0.20	0.29
54"	4'8'8"	4	10	5-1/2	0.50	0.37	0.55	6-1/8	0.34	0.26	0.38
				Concrete — 5000 psi							
60"	4'8'8"	4	10	6	0.59	0.45	0.66	6-3/4	0.41	0.31	0.46
66"	4'8'8"	4-1/2	10	6-1/2	0.69	0.52	0.77	7-1/4	0.51	0.39	0.57
				Concrete — 5000 psi							
72"	4'8'8"	4-1/2	10	7	0.79	0.60	0.88	7-3/4	0.61	0.46	0.68

RUBBER GASKET CONCRETE PIPE

(81) When specified rubber gasket concrete pipe shall be of the Bell and Spigot Type through 48" in diameter and of the Tongue and Groove Type or Bell and Spigot Type in diameters fifty-four (54) inches and above, and the joints shall conform to the latest specifications of the A.S.T.M. C 443 for Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible, Watertight, Rubber-Type Gaskets. The pipe shall conform in all other respects to the Specifications for Non-Reinforced Concrete Pipe for Sewers and Drains (ASTM C-14) or the Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe Designations C-76 Table II, III or IV whichever is specified.

(82) The Contractor shall submit to the Engineer drawings of the pipe and joint prior to delivery and installation for approval.

CAST IRON PIPE AND SPECIALS

(83) Pipe of less nominal diameter than three (3) inches shall be of six (6) foot or nine (9) foot lengths, delivered assembled in eighteen (18) foot lengths. The ends of these eighteen (18) foot lengths shall be standard bells and spigots, the intermediate joints shall be oversized threaded joints. The barrel of the pipe shall be at least four-tenths (.4) inch thick. This small diameter pipe must be cast horizontal in sand molds; the specifications for its material and manufacture must be equal to those of the McWane Cast Iron Pipe Co. of Birmingham, Ala.

CAST IRON PIPE AND FITTINGS

(84) Cast Iron Pipe of 3" nominal internal diameter or larger shall be of the bell and spigot pattern for use with lead joints; the pipe shall be centrifugally cast and shall have thickness corresponding to class 25 of A.S.A. Specifications A21-6 or A21.8.

(85) All centrifugally cast pipe shall be of the manufacturer's standard length not to exceed twenty (20) feet, however. Centrifugally cast pipe shall be cast with beads on the spigot ends unless the method of manufacture makes the casting of beads impracticable.

All centrifugally cast pipe shall be made of metal having the following physical characteristics or better:

Tensile strength as established by full length bursting test, p.s.i., minimum _____	18,000
Modulus of rupture as established by ring test, p.s.i. minimum _____	40,000
Secant modulus of elasticity as established by Talbot Strip Test, p.s.i., maximum, A21.6 _____	12,000,000
A21.8 _____	10,000,000

(86) All centrifugally cast pipe shall have a lining equal to Enameline, composed of a thin lining of cement, centrifugally applied and covered with a seal coat; and shall have an exterior coating of enamel equal to the best grade used for this purpose.

(87) Cast Iron Pipe larger than 48" nominal internal diameter shall be of the bell and spigot pattern for use with lead joints; the pipe shall be pit cast and shall have a thickness corresponding to class 3 of A.S.A. Specifications A21-2. The lining and coating shall be the same as applied to smaller pipe.

(88) The cast iron pipe fittings shall be made in accordance with the latest "American Water Works Standard Specifications for Cast Iron Water Pipe, and Fittings" and shall be suitable for use with the Class of pipe in the sizes and diameters called for. The fittings shall be made from Class "D" patterns up to 12" & of class B pattern for sizes above 12". All fittings shall be lined and coated with the standard coal tar dip.

MECHANICAL JOINT PIPE

(89) Locked Type Mechanical Joint Pipe shall be provided with joint sockets, socket flanges, packing glands, gaskets and bolts in conformity with requirement of A.S.A.—A21.11 Standard Specifications with an amendment to the first paragraph of Section 11-9 of these Specifications as follows:

"American Stainless Bolts AISI Type 416 or CA-20-F with the following typical physical properties shall be used:

Tensile strength—93,600 p.s.i. Average.

Yield Strength—60,000 p.s.i. Minimum.

The Typical Chemical Analysis shall be:

Si — 1.20%

Mn— 1.00%

Cr—12.5%

Ni — .50

C — .14%

S — .15%

P — .05%

(90) This Lock type joint requires cutting a groove in the spigot end of the pipe and assembling the Lock Type Glands at the foundry. The thickness of the pipe from the bottom of the machined groove to the inside wall of the pipe shall be a minimum of thickness Class 25 according to A.S.A. 21.6 and A.S.A. 21.8.

(91) All cast iron pipe must have the Manufacturer's Certificate of Inspection and Test. This is not to be interpreted, however, as a waiving of any rights on the part of the Sewerage and Water Board or its representatives to further inspect and reject the cast iron pipe.

(92) Pipe and Specials ordered with lugs so that they may be bolted to adjacent units shall have lugs of shapes, dimensions, and locations according to A.W.W.A. standards on all bells and all spigots of each lugged piece. Lugged pipe shall be twelve (12) feet in laying length.

(93) Bolts for use on lugged joints shall be mild steel coated with a hot coal-tar enamel; they shall be of 1" diameter for pipes, etc., of 30" size and smaller, they shall be of 1¼" diameter for pipes, etc., of 36" size and larger. They shall be furnished with square head nuts and with steel washers.

(94) Specials of all sizes shall be A.W.W.A. standards and shall be accompanied by the manufacturer's certificate of inspection and test.

CAST IRON FLANGED PIPE AND CAST IRON FLANGED FITTINGS

(95) Cast Iron Flanged Pipe and Cast Iron Flanged Fittings shall conform to Class B of the A.W.W.A. 1908 Specifications for sizes larger than 12" and class D for sizes 12" and less.

POLYETHYLENE WRAP

(96) The Sewerage and Water Board Engineer may, at his discretion, indicate that the cast iron pipe shall be wrapped with sheets or tubular of polyethylene of 6 mil thickness, having a minimum tensile strength of 1200 p.s.i., and a moisture absorption of not more than 0.01% in 24 hours. The polyethylene sheets shall be wrapped around the pipe with a minimum overlaps of six inches (6") and sealed with black polyethylene tape.

All fittings and valves in sections of pipe indicated as wrapped pipe shall be encased in polyethylene film of the same specifications as above and shall be taped twice around.

ASBESTOS-CEMENT PIPE & COUPLINGS

(97) All asbestos-cement pipe for water mains shall be manufactured in accordance with current AWWA Specifications C-400, and the maximum uncombined calcium hydroxide content shall not exceed one (1) per cent. Pipes in sizes of six (6) inches diameter and smaller shall be Class 200, and pipes of sizes eight (8) inches and larger shall be Class 150, unless otherwise specified on Contract drawing and/or Special Specifications. Couplings for use with these pipes shall be of the same material as the pipes. Unless otherwise specified herein the pipes and couplings shall be governed by the requirements of the A.S.T.M. Standard Specifications for asbestos-cement Pressure Pipe No. C-296. The material shall be formed under pressure and cured by autoclave process to meet its physical and chemical requirements of its specifications.

(98) This asbestos-cement pipe is to be used with iron fittings, valves and hydrants, the iron fittings less than ten (10) inches in nominal internal diameter will be of Class D. The actual inside diameters of pipes must be at least ninety-five per cent (95%) of the nominal inside diameters.

(99) Not less than three per cent (3%) of the total length of pipe of each size shall be composed of pipes of approximately one-third (1/3) the standard length, machined on the outside for the full length of each piece; a coupling shall accompany each piece of this all-machined pipe. This requirement is to permit the use of couplings in setting valves, hydrants or cast iron fittings in their designated locations.

(100) Asbestos cement pipe to be used as a sewer main shall be non-pressure sewer pipe of the class strength specified in the Drawing or in the special specifications, manufactured in the same manner as above. The couplings for use with the pipe shall be composed of the same material as the pipe. The pipe and couplings shall be governed by the requirements of the A.S.T.M. Standard Specifications for asbestos-cement non-pressure pipe No. C-428-59T or the latest current revisions.

(101) The asbestos-cement sewer pipe shall be lined with an epoxy resin base lining of one hundred per cent (100%) solids content (solvent free) meeting the detailed requirements of material and application of "Lined Transite Asbestos-Cement Pipe", Johns-Manville Co.

(102) All pipes and couplings tendered for use must be accompanied by the manufacturer's certificates of test and conformity to the said A.S.T.M. Standard Specifications for AC pipe No. C-296- or the latest revision.

CONCRETE PRESSURE PIPE

(103) Concrete Pressure Pipe furnished shall be prestressed concrete pipe having steel joint rings with rubber gaskets. All pipe shall be furnished complete with all necessary jointing facilities and materials including bolts and nuts for tied joints, together with other required accessories necessary for proper installation.

(104) Except when specifically stated, otherwise the A.W.W.A.C.-301-58 Standard Specifications of the current revision thereof for "Reinforced Concrete Water Pipe—Steel Cylinder Type, Prestressed" shall govern and control the manufacture of all prestressed concrete pressure pipe together with the required appurtenances.

(105) The length of the pipes shall be of the manufacturers' standard laying lengths.

STEEL PIPE

(106) Steel Pipe for use as a water main shall be fabricated in accordance with A.W.W.A. C-201-60T "Standard Specifications for Fabricated Electrically Welded Steel Water Pipe."

STEEL PIPE FITTINGS

(107) All fittings and specials shall be in accordance with A.W.W.A. C-208-57 "Tentative Standard Specifications for dimensions for Steel Water Pipe Fittings", unless a detail for fittings other than C-208 is specifically shown.

STEEL FLANGES

(108) Flanges shall be of steel plate conforming to A.S.T.M. A 283 Specifications, Grades B, C or D, or A.S.T.M. A 7.

Flanges shall be faced smooth or may have a serrated finish of approximately 32 serrations per inch and approximately 1/32" deep.

Flanges shall be drilled to conform to the 125 pound American Standard for Cast Iron Pipe.

INTERIOR COAL-TAR ENAMEL LINING

(109) The steel pipe shall have an interior coal-tar enamel lining in accordance with A.W.W.A. C-203-57, "A.W.W.A. Standard for Coal-Tar Enamel Protective Coatings for Steel Water Pipe". The priming shall extend to the ends of all pipe and specials. The enamel shall extend to within 8" of the ends. The interior of the pipe shall be white-washed at the ends for a distance equal to the diameter.

EXTERIOR COAL-TAR ENAMEL COATING

(110) All exterior coal-tar enamel coatings shall be in accordance with A.W.W.A. C-203-57, Section A14, "Coal-Tar Enamel Fibrous Glass Material and Bonded Asbestos Felt Wrap". The priming shall extend to the ends of all pipes and specials. The enamel shall extend to within 8" of the ends. The bonded asbestos felt shall be coated with white-wash in lieu of being wrapped with Kraft paper.

EXTERIOR CEMENT MORTAR COATING

(111) The Sewerage & Water Board may at its discretion order that an exterior Cement Mortar Coating be applied either over the coal-tar coating or to the bare pipe. This cement mortar coating shall be 2" thick placed by the Guniting Method in accordance with A.W.W.A. Specification C-205-41 or the latest revision thereof.

(112) The Engineer reserves the right to accept as an alternate or as a replacement for the "gunite" applied coating, a cement-mortar coating applied by the brush-coat method. The cement-mortar shall be applied to the pipe by a high speed belt, or brush applicator, at an impact velocity between 4,000 and 5,000 feet per minute. The pipe shall be rotated and traveled past the applicator in such a manner that the concrete forms an even continuous covering over the entire length of the pipe, with the exception of 9 inches to 12 inches at each end.

VALVES

(113) All valves shall conform to the requirements of the following paragraphs below. The Contractor must submit with his proposal drawings, catalogues, specifications, or other descriptive matter of the valves he proposes to furnish. The right is reserved by the Board to accept the valves which it considers best suited to the conditions under which they will be used.

GATE VALVES

(114) For water line service of all gate valves, size 12" and smaller shall be double disc valves as manufactured by the M. & H. Valve & Fittings Company of Anniston, Alabama, in accordance with their drawing #9274, or Mueller Co., of Chattanooga, Tennessee, their drawing #6143, both in accordance with Sewerage and Water Board Specifications and modifications.

Valves of sizes larger than 12" shall be to the same specifications as stated above of a manufacturer approved by the Sewerage and Water Board.

(115) For all contracts let by the Sewerage and Water Board for the expansion of water lines, valves and/or fire hydrants of all sizes will be furnished free to the contractor.

(116) Valves for use in sewer lines shall be single solid wedge disc valves. They shall be iron body brass trimmed with non-rising Bronze stems. They shall open by turning clockwise. They shall be designed for not less than 80 P.S.I. The types of operators shall be described in the special specifications.

(117) All Gate Valves shall be proportioned for strength and durability with mechanical parts simple, complete and certain of operation. They shall be constructed of the best quality materials, and with first-class workmanship. Discs shall not stick in the seats, passages shall not be easily clogged, and parts shall not be easily deranged or broken. The screw threads on the valve stems shall be cut so as to work truly and smoothly. All operating nuts shall be two (2) inches square. All gate valves shall open by turning clockwise or to be right.

(118) Each gate valve shall be cold hydrostatically tested at the factory in the following manner, without developing any leak, hissing or sign of weakness.

1st. Heads shall be secured at each end of the casting, the valves opened, and a pressure of 200 pounds per square inch applied.

2nd. The face joints of all valves shall be tested by closing the valves leaving one end of the casting open, and applying a pressure of 150 pounds per square inch to the other end; this operation is to be reversed to test the other face.

(119) The plug used to close the hole in the body of the valve through which pressure for the factory tests is applied shall be made so as to be removable in case the Board may wish to use the hole for tests at some future time.

(120) The Contractor must present a certificate from the makers that the above tests have been properly applied to and withstood by all gate valves.

(121) Valves of 16" and larger shall be vertical valves with spur gears operated by a non-rising vertical stem. Each gate valve of size 30" or larger shall have a by-pass at least four (4) inches in size provided with the same size flanged ends valve. The material and workmanship of this by-pass valve shall be equal in quality to that specified for the main valves. The operating gears of valves of 30" size or larger shall be enclosed in a separate grease tight housing provided with a stuffing box independent to the main valve stem.

CHECK VALVES

(122) For water line service all check valves shall be of the tilting disc partially balanced type, as manufactured by the Chapman Valve Mfg. Co., or equal. If a valve of other make is offered as a substitute it shall be presented for consideration and approval by the Engineer within two weeks after the award of the contract, and the decision of the Engineer as to its acceptability shall be final. Check valves will, in general, be governed by the following specifications in paragraph No. 123 below.

(123) The bodies shall be of cast iron with bell or flanged ends as specified and either be split on the line of the seats or have an opening with a bolted-on cover at the top so as to allow removal of the disc. The design shall be such that the net cross-sectional area throughout the valve shall be equivalent to the area of the pipe line, and the loss of head through the valve, at a velocity of 8 feet per second, shall not exceed one foot. No by-pass openings shall be provided on the valve bodies.

The disc shall be of cast steel. Both the disc and the body shall have bronze seat rings, securely held in place. All wearing parts of the hinge arrangement shall be brushed with non-corrosive metal. The disc shall hang in the closed position when there is no flow, making complete contact.

(124) For sewage line service all check valves shall be of the single swinging disc type with cast iron body. The valves shall have a bronze seat, securely held in place, and a bronze faced disc. The disc hinge pin shall be of rolled bronze or equally acceptable non-corrosive metal, with an integral head on each end. A full nut screwed against a shoulder with a lock nut as a keeper will be acceptable in place of the integral heads on the hinge pin. The bearings for the hinge pin shall have removable caps secured in place by bronze studs with bronze nuts and bronze locknuts. An opening through which the disc can be removed shall be provided and the cover plate for same shall be securely bolted on with hexagon head bolts with cold punched hexagon nuts. The joint shall have faced surfaces and be provided with a suitable gasket.

(125) All check valves whether for water or sewage line service shall receive a thorough test for strength of parts and for tightness of disc at various pressure; the disc shall be tight at pressures ranging from 20 p.s.i. to 150 p.s.i., the whole valve shall withstand the pressure of 250 p.s.i. without developing any leak, hissing or sign of weakness.

The Contractor must present a certificate from the makers that these tests have been properly applied to and withstood by all check valves.

(126) Where bell ends valves are specified the bell ends shall be of the proper sizes to receive A.S.A. Class 25 thickness, Specifications A 21.6 or A 21.8 cast iron pipe.

DRILLING OF FLANGES

(127) The drilling of flanges for flanged pipes, specials, gate valves, check valves or any other flanged item to be installed in the water distribution or in the system of sanitary sewers shall be, unless otherwise specified according to the 125 pound American Standard for Cast Iron Pipe Flanges, etc., of the American Standards Committee.

FIRE HYDRANTS

(128) Fire hydrants now in use by the Sewerage and Water Board are of the design known as the "Mathews Modernized" Hydrant, Type M62. All new hydrants must be so similar to those now in the system that parts shall be interchangeable and before making a contract for the purchase of hydrants the Contractor must satisfy the Engineer that the hydrants he proposes to furnish conform in these respects as well as to the other requirements of these specifications. They shall be of nominal 5" size; they shall have base elbows for 8" hydrant leads and shall have one steamer nozzle and two hose nozzles of size, shape and threads as shown in Drawing No. 4674½-F-2. See paragraph 115 relative to furnishing fire hydrants.

(129) The hydrant parts shall be of such vertical dimensions that when the protection case extends reasonable distances both above and below the ground line the center line of nozzles will be not less than eighteen (18) inches and not more than twenty (20) inches above the same ground line. With the said nozzle height the barrel length shall be such as to provide three feet and six inches (3'-6") of cover over the top of the hydrant lead where it enters the base elbow of the hydrant. These conditions are satisfied, in the current design of the Mathews Modernized Hydrant when the over-all length of the barrel, from top of swivel flange to bottom of threads, is four feet and six inches (4'-6"); modifications of design must take this into account. When hydrants are to be set with more or less than the standard cover over the lead the nozzle height must be maintained as required above, the difference in depth to the lead must be provided for in the lower part of the barrel. Hydrants of different lengths will be designated by the "Depth of Cover", meaning the depth from ground surface to top of hydrant lead where it enters the hydrant.

BELL-JOINT CLAMPS

(130) Clamps to be placed over the bells of cast iron water pipe shall be Dresser Bell-joint Clamps, Style 60, or Joslyn Style 440 or the equal thereof in design, workmanship and materials.

(131) Asphaltic surfacing and asphaltic binder, whether used individually or used jointly, shall conform in all respects to the "General Specifications and Standard Plans for Street Paving and Temporary Surfacing," of the City of New Orleans, as presently adopted by the Commission Council.

GENERAL SPECIFICATIONS
SECTION D
THE CONSTRUCTION OF SEWERS
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D-01 MEASUREMENTS, UNITS, PAYMENTS

(a) Measurements for the length of sewers will be made horizontally along the pipe from the center line of connecting manholes. The depth will be calculated from average elevations taken at approximately twenty-five (25) foot intervals along the surface to the authorized subgrade. If the ground surface is very irregular, the elevations will be taken at such spacing to give a true average depth.

(b) The average depth of a sewer crossing under a waterway or open canal will be calculated below a straight line joining the natural (not the super-elevated) surface on both banks; the average depth under a closed canal, track or other embankment will be calculated below the actual ground surface.

(c) Pipe sewers will be paid for at price bid per linear foot for each material size and depth. Payment of the price bid for all incorporated items will be full compensation for all labor, material, and equipment and for furnishing, hauling and installing the pipe and fittings complete, including all excavation, backfill, compaction, removal of surplus material and for all surface maintenance.

(d) If any block of sewer shall be laid in a depth bracket on which bids have not been asked, the contractor shall submit in writing a price in conformity with other price bids. The price submitted shall be agreed upon and approved by the Engineer.

(e) The depth of manholes will be measured from the top of the manhole casting to the invert of the lowest outgoing sewer line or stub.

See drawing No. 6178-B-6 for manhole detail and foundation.

(f) Sewer manholes will be paid for at the prices bid for manholes, complete in place, of the various depth brackets. The price and payment will be full compensation for all labor and equipment, excavation, all sheeting and bracing, backfill and compaction and furnishing all the materials, including everything from the shell foundation to the casting; the removal of surplus material and doing all necessary incidentals to make a complete structure. Drop pipes for high incoming sewers will be paid for per vertical foot measured from the lowest invert in manhole to the invert of the incoming sewer; this price shall include the whole cost of the drop, increased size of excavation, additional foundation material, brickwork, pipe and fittings and other incidentals for a complete unit according to detail Drawing No. 6178-B-6.

(g) If any standard manhole shall be built in a depth bracket on which bids have not been asked, the Contractor shall submit in writing, a price in conformity with other prices bid. The price submitted shall be agreed on and approved by the Engineer.

(h) The restoration of street and/or sidewalk surfaces shall be paid for at the prices bid in the proposal for all items incorporated in these restorations. No further payment shall be made to the Contractor for the maintenance of these surfaces.

(i) The payment for Extra Work not covered in the proposal shall comply with the requirements of Section A, Paragraph 34, of the General Specifications. In the event the Contractor and the Engineer elect to pay by Force Account the fee shall be fixed at not more than 20%. In order for the Board to pay for the extra work in this manner, the Contractor's representative, at the end of each work day, must fill out a labor form stating the name, rate and the time that each man worked that day along with a description of the equipment in use and the numbers of hours that each piece of equipment was in service that day. The rental rates shall be not more than 80% of the rates listed in the current edition of Average Rental Rates as compiled by the Associated Equipment Distributors. The Board shall elect to use the hourly, daily, weekly or monthly rate, whichever is to their best interest. The form shall be signed daily by a representative of the Contractor and the Board; each shall retain a copy for their files.

D-02 EXCAVATION

(a) Excavations shall be open cuts with vertical sides, unless in special cases the Engineer shall permit tunnels or sloping sides. If tunnels are so authorized they shall be of no greater width than the authorized cuts and shall be properly braced against caving. Sloping trench sides may be used only with the permission of the Engineer and in no case shall the slope extend below one-half of the trench width above the crown of the pipe.

(b) All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for prosecution and inspection of the work.

(c) The Engineer shall have the authority at any time to require the Contractor to discontinue the use of any excavating machine or other appliance which, in his judgment, is not adapted to the purpose for which it is being used. Drag line operation will not be permitted. He may require the last four (4) inches removed in such a manner as not to disturb the sub-grade.

(d) The foundation material placed under the pipe shall be in accordance with Drawing Nos. 4697-E-5-A, 6187-E-5, 6312-E-5, and the detail drawings and/or as directed by the Engineer.

(e) Should any excavation made by the Contractor in accordance with the plans or by the direction of the Engineer prove to be unnecessary, it shall be properly backfilled and it will be paid for at the price bid for Extra Excavation. The price bid for Extra Excavation shall include backfilling and removal of surplus earth.

(f) In case the excavation for any structure is carried below the grade established by the Engineer, the Contractor shall fill the bottom of the excavation up to grade with clam shell and in a manner acceptable to the Engineer, without compensation for either the excavation or the backfilling.

(g) No greater length of trench shall be opened in advance of the completed structure nor left unfilled to the rear than shall seem proper to the Engineer who will be guided by the circumstances. The permissible length of unfilled trench shall not exceed one hundred (100) feet. An open trench in advance of pipe laying operations at the close of the days work will not be permitted.

(h) The price bid for "Extra Excavation to 12 ft. depth" is interpreted to cover all excavation from the surface down to the twelve foot depth whether or not the total depth of the excavation exceeds twelve feet. The price bid for "Extra Excavation below 12 ft. depth" is interpreted to cover only such excavation as is made at a greater depth than twelve feet. For example, an extra hole one yard square and fifteen feet deep would call for four cubic yards of "Extra Excavation to 12 ft. depth" and one cubic yard of "Extra Excavation below 12 ft. depth."

D-03 EXCAVATION TO REMOVE STUMPS, ETC.

(a) If any stumps, roots, logs, or other hard solid masses of matter are encountered at or near the authorized sub-grade within the trench area, such stumps, etc., shall be cut to a further depth of one (1) foot, or less if so authorized by the Engineer. The Contractor shall fill this excavated space with clam shell. Payment for same will be at the price bid for Extra Excavation to Remove Stumps and for Shell Backfill.

(b) When so required by the Engineer, the Contractor shall probe one (1) foot below the established bottom of the trench and if any stump, roots, logs, etc., are discovered by this probing, the Contractor shall cut them out just as if they had been visible in the trench and he will be paid for this work as described just above.

(c) The price bid for Extra Excavation to Remove Stumps, etc., is interpreted to cover all excavation for this purpose regardless of depth.

(d) If the Contractor shall, with the consent of the Engineer and the permission of the municipal authorities, blast stumps, etc., out of his excavation with explosives, no payment will be made. The Contractor will be required to fill the void made by the blasting without any payment for either extra excavation or for the backfilling.

D-04 SHEETING AND BRACING

(a) Protection of the excavation against caving or settling of the banks shall be the sole responsibility of the Contractor. He shall protect the sides of his excavation by sheeting and bracing as may be necessary. No actions or instructions by the Engineer shall be regarded as the responsibility for the security of the trench or the surrounding areas. The full responsibility remains with the Contractor.

(b) The use of standard sheeting, bracing and foundation lumber is mandatory when the cover on the clay, plastic truss, or concrete pipe exceeds nine (9) feet and when the cover on epoxy lined asbestos-cement pipe is in excess of the allowable indicated in the schedule on drawing 4697-E-5-A. The Engineer has the authority to order the use of standard sheeting, bracing, and foundation lumber in lesser depths, when, in his opinion, the soil conditions warrant its use. Payment for the sheeting, bracing, foundation lumber and shells will be at the prices bid in the proposal for these items, but only for the quantities shown in the table on drawing 4697-E-5-A.

(c) Sheeting or other bracing not according to Drawing 4697-E-5-A that does not extend down as far as the top of the sewer pipe may be removed at the discretion of the Contractor, provided that the trench has been backfilled and tamped to a level of eighteen (18) inches above the top of the pipe. Said removal shall not cancel or diminish the Contractor's obligation to secure his excavation as outlined in above sub-paragraph (a). If this sheeting is left in place, it shall be braced in the manner shown on drawing 4697-E-5-A, except that the longitudinal braces can be 2 x 12 material. The entire cost of this sheeting, and bracing shall be borne by the Contractor.

(d) Any sheeting and/or bracing which extends below the top of the pipe, and is not placed as shown on drawing 4697-E-5-A, shall be adequately braced to the satisfaction of the Engineer and both the sheeting and bracing shall be left in place. No payment will be made for this sheeting and/or bracing.

(e) All sheeting left in sewer trenches shall be cut off a minimum of three (3) feet below the normal ground surface and it shall be adequately braced, to the approval of the engineer, at or near this point of cut-off. The cost of the braces shall be borne by the Contractor.

(f) Steel sheeting shall be used only with the approval of and under the prescribed terms, provisions, conditions and methods directed by the engineer.

D-05 BEDDING, TRENCH WIDTHS, ETC., ESSENTIAL FACTORS

(a) The trench width is a factor that affects the loads imposed on the pipe, and the bedding condition affects the pipe strength.

(b) The tables and notes shown on Dwg. 4697-E-5-A were compiled from the values derived from these factors.

(c) It is essential, therefore, that the spacing of the sheeting and bracing, the bedding, planking and foundation material conform to the above drawing or other contract drawings.

(d) The trenching conditions shown on Dwg. 4697-E-5-A are the minimum requirements of the Board. However, prior to purchasing any pipe, the Contractor must have written certification from the pipe manufacturer that his product will sustain the earth loads imposed when the pipe is installed in accordance with this and the other contract plans.

(e) Any deviation by the Contractor, from the contract plans and laying conditions shall have the written approval of the Engineer. However, the Engineer's approval does not relieve the Contractor of his responsibility to the Board for an installation that is on line and grade, free of cracked pipe and within the infiltration limitation.

(f) All pipe found defective after installation shall be reinstalled by the Contractor at no cost to the Board.

D-06 FOUNDATION

(a) Lumber used as foundation under pipe sewers, whether it is laid longitudinally as shown on Drawing No. 6187-E-5, or laid transversely on rangers as shown in drawing No. 4697-E-5-A, will be paid for as Foundation Lumber Under Sewers.

(b) The bedding material, which is usually clam shells, shall be laid on the planking or on the subgrade without any planking in accordance with the Contract Drawings or as directed by the Engineer. Payment will be at the prices bid and in the quantities authorized by the bottom table shown on Drawings Nos. 4697-E-5-A and 6187-E-5.

(c) Lumber for use as foundation for sewers shall be No. 2 Common Southern Pine unless substitutes are requested that meet with the approval of the Engineer.

(d) The cost of cutting, placing and fastening any lumber for sheeting, bracing, foundation and the like, including the nails, spikes, or other fasteners, shall be absorbed in the cost of the lumber itself whether this lumber is paid for at a bid price or is included in the price of some other item.

D-07 CLAY PIPE FOR SEWERS

(a) All clay pipe shall be extra strength conforming to the current ASTM-C-200 Specifications for "Extra Strength Glazed Clay Pipe".

(b) The current ASTM-C-301 Specification for the "Standard Method of Testing Clay Pipe" shall govern the testing of the pipe when testing is called for in the "Special Specifications".

(c) Pipe joints shall conform to the current ASTM-C-425 Specification for "Compression Joints for Vitrified Clay Bell and Spigot Pipe". The joints may be any one of the three types mentioned in the specifications. Poured joints are not acceptable.

(d) The installation of the clay pipe shall conform to the current ASTM Specification C-12 "Recommended Practice for Installing Vitrified Clay Pipe" except where specific procedures required therein are contradicted by the General and/or Special Specifications for the contract.

D-08 EPOXY LINED CONCRETE SEWER PIPE

(a) The concrete sewer pipe shall be non-reinforced, conforming to the current ASTM Specification C-14 for the Extra Strength Class or the current ASTM Specification C-76 for Reinforced Concrete Sewer Pipe Classes IV and V only.

(b) The flexible water tight rubber gasket joint shall comply with all requirements of the current ASTM C-443 Specifications.

(c) The epoxy lining shall conform to the current National Sanitation Foundation Criteria C-7 and to the current A.S.T.M. C-541 Specifications.

(d) The use of "Mainstay", or approved equal, composite concrete pipe is permitted. This is a monolithic concrete pipe having an integrate inner wall surface, consisting of a coal tar-epoxy vehicle filled with selected siliceous aggregates, with an average thickness of 100 mils and with a minimum thickness of 90 mils. The lining shall extend the full length of the barrel of the pipe and shall be free from pinholes, voids and other defects.

(e) A protective coating consisting of a coal tar-epoxy resin manufactured by USS Chemicals, or approved equal shall be applied to the joint area of sufficient thickness to provide a continuity of corrosion protection to such surface areas.

(f) "Mainstay" joint compound, a coal tar based mastic manufactured by USS Chemicals, or approved equal, shall be applied to the joints to provide a continuity of corrosion protection to such surface areas.

D-09 EPOXY LINED ASBESTOS-CEMENT PIPE FOR GRAVITY SEWERS

(a) All epoxy lined asbestos-cement pipe used for gravity sewers shall conform to the current Federal Specifications SSP-331-B Type II or the current ASTM C-428 Specifications Type II.

(b) The epoxy lining shall conform to the current National Sanitation Foundation Criteria C-7 "Plastic Lined Asbestos-Cement Pipe and Couplings for Sewers" and to the current A.S.T.M. C-541 Specifications.

(c) The installation of epoxy lined asbestos-cement pipe shall conform to the "Installation Guide" prepared by the pipe manufacturer and to the current AWWA C-603 Standard for "Installation of Asbestos-Cement Water Pipe", except where specific procedures outlined therein are contrary to the General and/or Special Specifications for this Contract.

D-10 CAST IRON PIPE FOR SEWERS

(a) All cast iron pipe for sewers shall be thickness Class 23 conforming to the current A.S.A. Specifications A21-6 or A21-8. Cast iron fittings shall be Class "D" for diameters of 4" to 12" inclusive.

(b) The joints for the cast iron pipe sewers shall be of a type as described in the Materials Section (C) of these specifications or a flexible water tight rubber gasket joint which complies with all the requirements of the current A.S.T.M. C-443 Specifications.

(c) Careful inspection of the plans will show whether cast iron pipe sewers consist mostly of straight pipe or whether they are inverted siphons, comprising a considerable number of specials; the Contractor must take this into consideration when making his bid, payment will be made for the horizontal length over the center of the sewer at the price bid per linear foot. In the event the proposal bid did not include siphons, the Contractor shall submit in writing, a price in conformity with other unit prices. This price shall be agreed upon and approved by the Engineer.

(d) The installation of this pipe shall conform to the manufacturer's installation guide or recommendations except where the recommended procedures are contrary to those outlined in the General and Detail Specifications for this Contract.

D-11 PLASTIC SEWER PIPE

(a) Eight (8") inch and larger plastic sewer pipe shall be of a plastic truss pipe design as approved by the Sewerage and Water Board. All voids in the truss pipe shall be completely filled with a mixture of light weight concrete and shall meet the design requirements as shown on Sewerage and Water Board drawing No. 6312-E-5.

(b) Six (6") inch plastic sewer pipe shall be solid wall plastic pipe having a minimum wall thickness of 0.28-inches and shall meet all design requirements as shown on Sewerage and Water Board drawing No. 6312-E-5.

(c) The trenching and construction requirements including connections to manholes, for the installation of the plastic pipe shall be as shown on Sewerage and Water Board drawing Nos. 4697-E-5-A and 6312-E-5.

D-12 GENERAL LAYING CONDITIONS

(a) Pipes and fittings shall be carefully inspected after delivery on the site of the work and will be rejected if in the opinion of the Engineer they are defective in such a way as to endanger the strength of the sewer or the tightness of the joint.

(b) No pipe shall be set in place and no joint shall be made with water standing in the trench or the bell hole.

(c) Whenever pipe laying is stopped, either for the night or for any other cause, the end of the pipe shall be securely closed to prevent the entrance of water, mud, or other matter, and shall be secured in such a manner as to prevent the end pipe from being dislodged by sliding or other movement of the backfilling.

(d) The pipes and fittings shall be so laid in the trench that after the sewer is completed, the invert thereof, shall conform accurately to the grades and alignment established by the Engineer. At any stage of construction of a straight stretch between two consecutive manholes, the zero, or starting end of the pipe shall be clearly visible on looking through the pipe from the other end, with the full cross-section of the interior of the pipe in clear view.

D-13 YS AND TS

(a) Ys or Ts for the reception of six (6") inch house connections shall be built into pipe sewers at points to be designated by the Engineer. The approximate number and the locations will be given in the drawings or in the Special Specifications for each contract.

(b) The cost of furnishing and placing the Ys, Ts, and caps shall be included in the price bid per linear foot for sewers of each size and depth.

(c) The number of Ys and Ts to be provided by the Contractor can vary 5% of the number shown in the drawing without any deductions or additional payment.

(d) All unused openings in branches of Ys and Ts shall be closed with caps of the same material as the sewer, held in place by secure joints of such type that the cap can be removed when so desired without damage to the bell of the sewer; these caps shall be set in place before the fitting is laid in the trench.

(e) In pipe sewers, the tops of which are not more than eight (8') feet below the street surface, taking the average depth of the whole block, the standard house connections opening will be a Y, laid with the six (6") inch branch pointing upward at an angle to suit the conditions.

(f) In pipe sewers, the tops of which are more than eight (8') feet below the street surface, taking the average depth of the whole block, the standard house connection opening will be a T laid with the six (6") inch branch placed vertical. This paragraph shall not be construed as forbidding the Engineer to order Ys placed in deeper sewers or Ts in shallower sewers if he deems such procedure desirable.

(g) Pipe sewers of twenty-four (24") inches or more in diameter will have no fittings for house connections unless they are called for in the Special Specifications.

D-14 SEWER HOUSE CONNECTIONS

(a) The Contractor shall lay 6" pipe sewer house connections from designated openings in the sewers to such points near the property lines as are designated by the Engineer. The standard connection shall have a nominal depth of three and one half (3½') feet at property line, a maximum of eight (8') feet at the sewer. Details are shown on Drawing No. 6187-E-5 and 6312-E-5.

(b) These depths are measured from the existing ground surface at or near the property line to the top of the barrel of the house connection pipe. Excavation to depths not greater than those just stated shall be included in the price bid per linear foot for six (6") Inch Sewer House Connections. Only the excavation to greater depths, when ordered by the Engineer, will be paid for at the price bid for Extra Excavation. House Connections of diameter larger than 6" shall begin from a manhole, and not from a wye or tee in the main sewer. Payment for these house connections will be as described in Special Specifications.

(c) The price bid per linear foot for Six (6") Inch Sewer House Connections shall include excavation to the standard depths stated above, bracing the trench, furnishing and placing the pipes of same material as main line sewer, for all the fittings indicated in the drawings, making the joints, backfilling, compacting the trench, cleaning up and removing surplus earth and waste materials, in general, furnishing all materials and doing all the work required for the complete installation of the house connections, including all items for which payment is not otherwise specifically provided.

(d) Payment for house connections will be made by horizontal measurement over the center of the connection, from the center of the sewer to the shoulder in the bell of the last pipe or fitting; payment for side branches out of the connection will be made the same way, by horizontal measurement from the center of the main connection to the end of the laying length of the last pipe or fitting of the branch. The unused branches of fittings out of which future connections may be laid will not be measured and paid for, only the used branch is covered by this paragraph. The Contractor shall set a vertical 6" double or single T or Y in each T-branch as indicated by the drawings; the cost of this vertical T or Y shall be included in the price bid for sewer house connections. If vertical 6" pipe is needed to raise this vertical T or Y to the proper height for a sewer house connection, the length of vertical pipe used will be considered and paid for as a 6" sewer house connection.

(e) Six inch house connections shall be constructed of the same type of material as the main line sewers, unless otherwise authorized by the Engineer.

D-15 BRICK MANHOLES

(a) All essential details of construction of brick manholes are shown in drawings accompanying these specifications; these drawings must be followed entirely. Bricks must be laid in full, close shove joints of mortar, according to best work standards, the mortar being of one part of Portland Cement to three parts of sand (see also correlated paragraphs in Section C). A reasonable number of bats, not smaller than half-bricks, will be allowed; chips of brick will be allowed for filling the angular spaces between the bricks in the circular walls.

Perforated bricks may be used in laying walls of the manhole above the bench, but only solid bricks may be used for building the walls and the base up to the top of the bench.

(b) Brick manholes shall be plastered on the outside with a coat of mortar one-quarter ($\frac{1}{4}$ ") inch thick. They shall be plastered on the inside with a thin coating of mortar of equal parts of cement and sand, worked to a smooth surface, or with a brush-on wash of neat cement at the option of the Engineer. Inverts and benches in manholes shall be surfaced with a one-half ($\frac{1}{2}$ ") inch thick layer of cement mortar composed of one (1) part of Portland Cement and two (2) parts of sand.

(c) Short bell pieces of pipe of such sizes as may be required shall be built into the brickwork of the manholes for the incoming and outgoing sewers indicated in the general plan for either immediate or future construction; the brick work shall be built arched over these pipes. Such of these bell pieces where sewers are not built immediately, must be securely closed with a stopper of such type as can be removed without damage to the pipe. These bell pieces shall be of the same materials as the sewers of which they form a part. Sewer manholes must be built in full conformity with the drawings; special attention must be paid to the method of forming the inverts, the arching of bricks over the bell pieces set in the walls and the height of the vertical part of the walls.

(d) The standard brick sewer manhole is circular in plan, four (4') feet in internal diameter at the bottom and two feet, eight and five-eighth inches ($2' - 8\frac{5}{8}$ ") in internal diameter, for the last twelve (12") inches, at the top of the brickwork, just below the manhole cover frame. See drawing No. 6178-B-6.

(e) The cast iron frame and cover shall be the flaring manhole casting shown on Drawing No. 6178-B-6.

(f) The walls shall be built vertical up to the top of the arch over the highest connecting sewer which comes in without a drop pipe, from this point the walls shall taper uniformly as per plan. The walls shall be "one brick" in thickness down to a point twelve (12') feet below the street surface and "one and one-half bricks" thick below that point. The prices bid for manholes of various depths must take these wall thicknesses into consideration; no extra payment will be allowed for the added thickness that is here specified. If the Engineer shall require construction of greater diameter than any on which bids are asked, the Contractor shall proceed as in item D-01 (g).

(g) Where in any sewer manhole, the vertical distance from the flow line of the outgoing sewer to the invert of the incoming sewer exceeds eighteen (18") inches, the Engineer may require a drop pipe to be built for the incoming sewer; typical drop pipes are shown on the manhole drawings. Drop pipes for 8" sewers will be six inches in diameter, drop pipes for sewers of other sizes will be as directed.

(h) Each sewer manhole shall preferably be completely built as the sewer is laid up to it. No sewer shall be laid out of a manhole until the brickwork has been constructed to an elevation above the top of the bell piece for that outgoing sewer.

(i) One bell and spigot joint (in clay or epoxy lined concrete pipe) on the incoming side of each sewer manhole may be permitted by the Engineer in order to properly locate the manhole and to provide the required hinge joint in the manhole wall. For this one joint, the use of an asphaltic base, cold plastic sewer joint compound as approved by the Engineer may be used. This joint to be made according to the manufacturers specifications.

(j) Manhole steps shall be of metal as specified in Paragraph 46, Section C, of the General Specifications and installed in accordance with the details as indicated on Drawing No. 6178-B-6.

D-16 PRE-CAST CONCRETE MANHOLES

(a) The pre-cast concrete manholes shall conform to the current ASTM Specification C 478 and to Drawing No. 6178-B-6.

(b) The pre-cast risers shall be the eccentric cone type.

(c) The manholes shall be designed for the actual conditions in the field and for the elevations of incoming and outgoing sewers.

(d) Sewer openings shall be completely encased on one section of the manhole viz. no single opening shall be contained in two adjacent sections.

(e) Manhole steps shall be provided as indicated in D-15(j) above.

(f) All brickwork as indicated for pre-cast concrete manholes on Drawing No. 6178-B-6 shall conform to Section D-15 Paragraph (a) of these specifications.

D-17 MANHOLE FOUNDATION SLAB

(a) All manholes shall rest on a concrete slab conforming to Drawing No. 6178-B-6.

(b) The tensile strength of the concrete shall be 3000 lbs./sq. inch and the reinforcing steel shall conform to the requirements of Section C of these General Specifications.

(c) The slab, if pre-cast shall have a minimum of 3 lifting eyes embedded in the concrete.

(d) Manhole slabs shall rest on a minimum of 6" of compacted sand and/or shells from the undisturbed subgrade and shall be set to provide the invert elevations as shown on the contract drawings.

(e) In case the excavation for any structure is carried below the grade established by the Engineer, the Contractor shall fill the bottom of the excavation up to grade with clam shell and in a manner acceptable to the Engineer, without compensation for either the excavation or the backfilling.

D-18 BACKFILLING

(a) Backfilling of sewer trenches shall begin as soon as the Engineer is satisfied that the joints have been made properly and the locations of the Wyes and Tees properly recorded. Clam shells shall be placed in the trench in such a manner as not to disturb the pipe and thoroughly, but carefully, compacted under and around the pipe as shown on the Contract Drawing. The backfill material placed above the shells shall be free from roots or other foreign matter greater than two (2") inches in diameter. After the trench is completely backfilled, the backhoe or mechanical equipment of equivalent weight shall roll over the trench repeatedly until the trench is compacted to a depth of nine (9") inches below the street surface. This void shall be filled with eighteen (18") inches of loose shells which shall be compacted to the depth of nine (9") inches. The Contractor will be paid for the original eighteen (18") inches of shell only. However, he shall be required to add shells from time to time during the ninety (90) days for which he will not be compensated as this is in compliance with his maintenance obligation. (See paragraph D-19.)

(b) Backfilling around manholes shall be done when the Engineer considers the brickwork to be sufficiently hard and the outer plaster coat thoroughly set. Selected excavated material shall then be placed and compacted in six (6") inch layers to eighteen (18") inches above the top of the highest pipe. The backfilling above this point to be completed according to paragraph (a) above. The protection of the excavation against caving or settling of the banks shall be as stated in paragraph D-04.

D-19 CONDITIONS FOR ACCEPTANCE:

"When the contract has been completed and tendered for acceptance, the Engineer will have it carefully inspected for defects and remeasured to verify the quantities. In order to be acceptable, the contract must be in a condition as herein described, namely:

(a) The sewers shall be true and to line and grade and shall not have infiltration of ground water in excess of 250 gallons per inch of diameter, per mile of pipe, per 24 hours including manhole infiltration. The infiltration measurement will be made by the Board.

(b) There shall be no cracked or broken pipes or fittings in either the sewers or the house connection lines.

(c) There shall be no defective joints.

(d) The pipes, manholes, or other appurtenances shall be free from mud, trash, debris, or other deleterious matter.

(e) The manholes shall be properly built in accordance with the drawings and specifications and shall show no cracks, displacement, or other defects in any part of the structure.

(f) Paved, partially improved or unimproved surfaces disturbed by the work of the contract, shall be in thoroughly good and stable condition to the extent required of the Contractor by the Specifications, and be inspected and accepted jointly by representatives of the Contractor, the Sewerage and Water Board and the Department of Streets."

D-20 MAINTENANCE OBLIGATIONS:

1. Sub-Surface Structures

(a) The maintenance period under this Section shall be for a period of forty-five (45) consecutive calendar days after the contract has been accepted by the Board and such acceptance has been recorded in the office of the Recorder of Mortgages for the Parish of Orleans.

(b) If at any time during the performance of the contract or during the maintenance period, any defect in the work shall develop or be discovered, the Contractor shall properly repair or replace the defective workmanship or material, even though prior to the development or discovery of such defects the workmanship or material has already passed inspection. At the end of the forty-five (45) day maintenance period the contract shall be in acceptable condition as described in Paragraph D-19 before final payment is made.

(c) In the event the Contractor fails to correct all defects occurring during this forty-five (45) day period within ten (10) days after receiving written notice by the Board; these defects will be corrected by others and all the costs will be billed to the Contractor or retained from any monies due him.

2. Surfaces

(a) The period of maintenance for surfacing shall be ninety (90) days and shall commence on the day of acceptance by the Board and such acceptance recorded in the office of the Recorder of Mortgages for the Parish of Orleans.

(b) During this maintenance period the Contractor shall maintain all surfaces, disturbed by his work, in first-class condition. When necessary he shall add additional surfacing material.

(c) All added surfacing material and all necessary cleaning and repairing of surfaces during this maintenance period is the obligation of the Contractor. However, the cost of doing this work shall be included in the price bid for other work under this contract; there is no item in the proposal whereby the Contractor is reimbursed for surface maintenance. He is reimbursed only for surface restoration.

(d) If the Contractor fails to repair the surfaces within ten (10) working days after receiving a written request by the Board, these surfaces will be restored by others and billed to the Contractor or his surety.

D-21 GUARANTEE PERIOD

(a) The Contractor shall guarantee all work for a period of one (1) year from the date of final acceptance by the Board. During this period the Contractor shall remedy all defects attributable to defective materials and/or workmanship within ten (10) working days after receiving written notification by the Board.

(b) In the event the Contractor fails to comply with this request within the allotted time, the necessary repair will be made by others and billed to the Contractor or his Surety.

D-22 INFILTRATION TEST

The Board shall pay all expenses connected with the initial infiltration test; in the event that the system, or any section thereof, does not meet the infiltration requirement making it necessary to re-test, the Contractor will be charged for this and all succeeding tests at the prevailing testing laboratory rates and the wage scales which the Board pays. At the time of this writing (4/13/67) these rates are as listed below but they are subject to fluctuation without notice:

Laboratory Technician — \$6.25/hr.
(minimum 4 hours)

Board's Forces to assist Technician — \$20.00/hr.
(minimum 4 hours)

All charges for re-inspection shall be paid prior to acceptance of the sewer line by the Board.

D-23 PUTTING SEWERS INTO SERVICE

(a) The Board may require the Contractor to prepare for inspection any section of sewer that is operable independent of other sewers under his contract. If their conditions are entirely satisfactory, the Engineer will recommend their acceptance by the Board and the Board shall then have the right to make house connections to these sewers with its own forces or those of the Contractor. These house connections may be put into service, and this section of sewers treated, in general, as a completed part of the sewer system, all without prejudice to the contract.

(b) When any such section of sewers has been put into use, the Contractor shall protect such sewers from the entrance of any mud or trash from his construction work and shall also assume all the cost and responsibility of protecting his uncompleted work from water arising in the completed and used section.

(c) The acceptance of the sewers and manholes in the said accepted section of the contract will be final, no further obligation for maintenance of the sewers and manholes in this section of the contract nor of the house connections installed thereto will be the responsibility of the Contractor; maintenance of the paved, partially improved and unimproved surfaces will be required however, except where such surfaces have been disturbed by the installation of house connections by the Board or by other work not a part of this contract. The retainer on this accepted section of the contract, will be withheld by the Board until the end of the maintenance period and the release of the retainer on the whole contract as set forth in Section A of the General Specifications.

D-24 GOVERNING SPECIFICATIONS

This section of the General Specifications supersedes all other conflicting sections of the General Specifications on matters pertaining to the installation of gravity sewers. It is superseded only by applicable provisions of the Special Specifications.

GENERAL SPECIFICATIONS
SECTION E
THE CONSTRUCTION OF CANALS AND PIPE DRAINS
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MEASUREMENTS, UNITS, PAYMENTS

- (1) Measurement for Drainage Canals will be per unit in place of the items entering into their construction.
- (2) Payment will be at the unit prices bid in the Proposal.
- (3) Measurements for the length of pipe drains will be made from center to center of manholes or from the inner face of walls to the end of the pipe, or from the inner face of walls to the point of tie-in with existing line plus two (2) feet.
- (4) "Y" or "T" branches of all sizes set in pipe drain shall be equivalent to a straight length of pipe of the same size and length plus two (2) additional feet of such pipe.
- (5) Drain pipe for house connections will be measured from the center of the main drain line to the end of the pipe.
- (6) Catch basin leads will be measured at right angles to the basin from the center of the main drain to the center of the catch basin.
- (7) Pipe drains will be paid for at the price bid per linear foot for laying pipe of each size. The price bid per linear foot of pipe shall include the furnishing of all labor and materials including the short bell pieces set in canal walls and the capping or sealing of all stubs, "Y" branches and the ends of the lines.
- (8) Drain manholes will be paid for at the price bid per vertical foot, for each size, measured from the invert to the top of the cast iron cover, which price shall include excavation, sheeting and bracing, furnishing all the materials, including everything from foundation planking to casting, both included, building the manhole, furnishing and placing the short bell pieces for incoming or outgoing drains, (these bell pieces shall be of the same materials as the drains of which they form a part) backfilling, removing the surplus excavated material, and doing or furnishing whatever else is necessary to make a complete structure.
- (9) Manholes over concrete canals will be paid for at the price bid per vertical foot, measured from the top of the finished concrete canal roof to the top of the cast iron cover, which price shall include the necessary forms, steps in the canal wall and brickmasonry and the cast iron frame and cover.
- (10) Catch basins will be paid for by the Catch Basin, according to size, at the prices bid in the "Proposal" for these items, which prices shall include excavation, furnishing all the materials including everything from foundation planking to casting, both included, building the catch basin, furnishing and placing a capped six (6) inch bell end in the rear wall of the basin, backfilling, removing the surplus excavated material and connecting each basin to open ditches.
- (11) Cleanouts will be paid for at the price bid for each in place. This price shall include excavation, furnishing all labor and materials, backfilling, removing of surplus earth and whatever else is needed to make a complete structure.

PILING

- (12) Piling shall be driven in locations called for on the plans and to resistances as required by the Engineer. If the Engineer shall require test piles to be driven they will be paid for at the price bid for Test Piles. The lengths of the construction piles will be based on the resistances developed by the Test Piles.
- (13) Piling shall be driven with a gravity hammer, steam hammer, water jets, or a combination of water jets and hammer. If water jets and hammer are used for driving, the jet shall be withdrawn, and the piles shall be driven by the hammer to secure final penetration and resistance. Piles shall, when necessary, be driven with a follower below the ground sur-

face. Piles shall not be driven closer than two (2) feet to cut-off and piles split or broomed below the cut-off line will be rejected. After the piles have been driven they shall be neatly sawed off at the exact cut-off.

(14) Piles will be paid for according to the length delivered at the site of the work provided the length delivered do not exceed the length ordered by the Engineer. The price bid shall include furnishing, delivering, driving, following and cutting off at the elevation required, and all drift bolts, nails, spikes and other fastenings.

EXCAVATION AND FOUNDATION

(15) Excavation shall consist of all material coming within the lines of the trench, the removal of which is not otherwise herein provided for. Excavation shall be open with vertical sides, unless in special cases the Engineer shall permit tunnels or sloping sides.

(16) Excavation limits for widths for drainage canals shall be as indicated on the plans. The limit of width of excavation for various sizes of pipe shall be as follows:

Internal Diameter of Pipe in Inches	Width of Trench in Feet
6	1.5
10	2.1
12	2.4
15	2.8
18	3.2
21	3.6
24	4.1
27	4.5
30	4.8
36	5.6
36x40	6.0
42x46	6.5
48x52½	7.0

When sheeting is used the width shall be measured horizontally between the inside faces of the sheeting. Regardless of the method or type of excavating the payment will be according to the above stated widths.

(17) The pay depth of excavation for reinforced concrete canals shall be to the bottom of the seal coat if seal coat is used. In the event the Engineer approves shells or any other similar substitute for the seal coat to stabilize the subgrade, the pay depth for excavation shall be 4" below the concrete bottom of the Canal. If decking is used, the pay depth will be to the bottom of the decking. If no seal coat is used, the pay depth will be to the bottom of the concrete canal.

(18) The Contractor shall leave a berme at least two (2) feet wide on each side of the trench, between the trench and the spoil bank, to allow the free passage of the Engineer or Inspector and to permit the Inspector to perform his work in an expeditious and satisfactory manner.

(19) The Engineer shall have the authority at any time to require the Contractor to discontinue the use of any excavating machine or other appliance which, in his judgment, is not adapted to the situation for which it is being used. He may require the last four (4) inches in depth of excavation to be done by hand or by such machine as is acceptable to him, and may forbid the use of such methods of excavation as seem likely to disturb the sub-grade.

(20) Should any excavation made by the Contractor in accordance with the plans or by the direction of the Engineer prove to be unnecessary it shall be properly backfilled and it will be paid for at the price bid for excavation.

(21) In case the excavation for any structure is carried below the grade established by the Engineer, the Contractor shall fill the bottom of the excavation up to the grade with suitable material and in a manner acceptable to the Engineer without compensation for either excavation or backfilling.

(22) No greater length of trench shall be opened in advance of the completed structure nor left unfilled to the rear thereof than shall seem proper to the Engineer who will be guided by the circumstances in each case.

(23) If the Contractor shall with the consent of the Engineer and the permission of the Municipal Authorities blast stumps, etc., out of his excavation, the Contractor will be required to fill the hole made by the blasting without compensation for either excavation or backfilling.

(24) Where the soil at the bottom of the excavation for a pipe drain is considered by the Engineer to be a satisfactory foundation for the pipe the bottom shall be grooved to form a hollow in which the barrel of the pipe shall be bedded; the depth of this groove shall be not less than one-tenth (1/10) the exterior diameter of the pipe.

(25) Bell holes shall be dug of sufficient size to let the whole length of the pipe barrel be bedded as required and to allow of the joints being properly made. The groove and the bell holes are a part of the required excavation for the pipe and their cost shall be included in the prices bid for the items of laying pipe drains.

(26) Where the bottom of the excavation is not, in the opinion of the Engineer, a suitable foundation for the drain, the trench shall be deepened and such foundation placed under the pipe as the Engineer may direct.

(27) The yardage excavated will ordinarily be calculated by cross-sections of fifty (50) foot intervals when the drainage canal, pipe drains or other structures are constructed in the beds of existing canals or ditches, otherwise a surface profile will be taken at twenty-five (25) feet intervals. If, in either case, the canal, or ditch, section or the ground surface is very irregular the cross-sections or the profile will be taken at such intervals as necessary to compute readily the proper volume of excavation.

(28) Excavation will be paid for at the price bid per cubic yard, which price shall include all labor, material and equipment, sheeting or sheet piling, bracing, backfilling, grading and the hauling away of surplus material.

SHEETING AND BRACING

(29) The Contractor is entirely responsible for the protection of his excavation against caving or settling of the banks and for all damage to pavement, buildings or other property caused by his excavation and he must protect the sides of the exca-

vation by sheeting and bracing or other shoring as may be necessary. If the Engineer disapproves of the precautions taken by the Contractor, he shall have the right to require that the excavation be braced and rendered secure to his satisfaction, even to the extent of requiring the use of close sheeting, or sheet piling, and suitable bracing (including all necessary nails, spikes or other fastenings), which must be of such form and dimensions and manner of application as will not be disapproved by the Engineer. The exercising of this right shall not be regarded as any assumption of responsibility by the Board for the security of the trench or the surrounding areas, full responsibility remains vested in the Contractor, the Engineer is merely expressing his distrust of the adequacy of the precautions proposed by the Contractor. The cost of all such shoring, whether placed on the Contractor's initiative or by the order of the Engineer, shall be included in the prices bid for the structure being built, it will not be paid for as such.

(30) When in the judgment of the Engineer removal of shoring is likely to cause damage to pavement or property, the Engineer may order such shoring as he considers necessary left in place and the Contractor shall not be entitled to any compensation therefor. Neither the giving of such orders by the Engineer nor his failure or refusal to issue such orders shall in any way relieve the Contractor for responsibility for damages to pavement or buildings. All sheeting left in place must be cut off at least two (2) feet below the ground surface.

(31) Under no circumstances will any sheeting, bracing or shoring of any type be paid for as such, its cost must be absorbed in the prices of items on which bids are asked in the "Proposal."

SHEET PILE DAMS

(32) The Contractor, at both ends of concrete canals and at intervals of approximately five hundred (500) feet, shall drive or otherwise sink across the total width of the trench before the bottom is laid, tongue and groove sheet piling, five (5) feet long made of three (3) 1" x 12" pine boards clinch nailed together. This sheet piling shall be neatly sawed off so as to extend not over one and one-half (1½) inches into the bottom slab. The cost of this work, including all nails, fastenings, etc., shall be included in the price bid for sheet pile dams in place. Sheet Pile Dams will be paid for per one thousand (1,000) feet board measure.

SEAL COAT

(33) A Seal Coat of the thickness indicated on the plans will be used as required where foundation conditions warrant its use. This will be determined by the Engineer and the amount in the "Proposal" is approximate for the comparison of bids. Grade "D" concrete shall be used in the Seal Coat. Seal Coat shall have a twelve (12) hour set before any work is performed on it. The Contractor will be paid at the price bid per cubic yard in place.

(34) Clam shells may be used in place of Seal Coat only with the approval of the Engineer. In such a case, a fill of clam shells the pay width of the trench and in sufficient quantity to stabilize the subgrade shall be used. A maximum thickness of one (1) foot may be used in lieu of 4" of Seal Coat concrete.

The shells will be paid for by truck measurement at the price bid in the "Proposal" for Clam Shell Bedding for Pipe Drains in Place.

REINFORCED CONCRETE CONSTRUCTION

(35) Water shall be removed from excavations before any concrete is deposited. Any flow of water into the excavation shall be diverted through proper side drains to a sump, or be removed by other approved methods which will avoid washing the freshly deposited concrete. The concrete shall not be laid in water, nor shall water be allowed to rise on or flow over any concrete until the concrete has set at least twenty-four hours. If the weather is threatening, no concrete shall be poured in those portions of the work that are liable to be flooded from a rain storm. In case fresh concrete is flooded, the opinion of the Engineer shall be final as to rejection and removal of this concrete.

(36) No concrete shall be placed when the atmospheric temperature is less than 35 degrees F. unless permission is granted in writing by the Engineer; when such permission is given the Contractor shall furnish sufficient protection to maintain the temperature of the air surrounding this concrete, at not less than 45 degrees F. for a period of five (5) days. It is understood that the Contractor is responsible for the quality and strength of the concrete placed under any weather conditions. No frozen materials or materials containing ice shall be used.

(37) The aggregates and water for concrete shall be accurately measured and the mixing, handling and placing of the concrete shall be in accordance with the requirements of paragraphs Nos. 36-48 in Section C of these General Specifications.

(38) Concrete shall be handled from the mixer to the place of final deposit as rapidly as possible by methods which will prevent segregation of the materials.

(39) Concrete shall be thoroughly compacted by puddling with suitable tools during the operation of placing and thoroughly worked around the reinforcement, around embedded fixtures and into the corners of the forms. Where conditions make puddling difficult, or where the reinforcement is congested, sufficient batches of cement grout shall first be deposited in the forms and the operation of filling with the regularly specified mix then be carried on at such a rate that the mix is at all times plastic and flows readily into the spaces between the bars. When pipes or castings are to be inserted in the concrete, great care shall be taken to keep them at the proper lines and grades and to tamp thoroughly under and around them. The concrete shall be placed only on one side of the pipe until the concrete flushes under the pipe and comes out on the other side.

(40) Construction joints shall be so made and located as to least impair the strength of the structure. At the points where it is necessary to stop the pouring of concrete, construction joints or bulkheads shall be set and keyways provided. Bulkheads shall be placed in their final position before concrete is poured against them.

(41) When joining concrete to previous pourings the old surface shall be thoroughly washed and cleaned and all loose or porous concrete removed.

(42) Should any voids or other defects be discovered in any part of the work the defective work shall be removed at once and the space refilled with suitable material, in a proper manner.

(43) All exposed surfaces of the concrete shall be covered with wet burlap immediately after the concrete has taken its initial set; the burlap shall be kept saturated with water for a period of twenty-four (24) hours or until the concrete has sufficiently hardened to permit final curing operations. Final curing shall consist of flooding or ponding or other approved methods to maintain curing for a minimum period of seven (7) days after the concrete has taken its initial set. The Con-

tractor shall not permit walking upon the concrete until it has set for a sufficient length of time which is to be determined by the Engineer.

(44) Concrete will be paid for at the price bid per cubic yard in place.

SLIP JOINTS

(45) Slip joints shall be constructed at such points and in such manner as shown on the plans, to the entire satisfaction of the Engineer; the material used for insulating shall be two (2) layers of smooth finish prepared roofing paper of medium weight of approximately forty-five (45) pounds per hundred square feet. The cost of all material and labor required in the slip joints as above specified shall be included in the price bid per cubic yard of concrete in place.

FORMS

(46) The Contractor shall provide suitable smooth, rigid and tight forms and centers, carefully set and maintained to line and grade. All forms and centers shall be thoroughly oiled and wetted, if required, before any concrete is placed in them. Sufficient time shall be allowed between the erection of the forms and centers and the placing of the concrete to allow thorough inspection.

(47) The forms may be removed from reinforced concrete structures at the times set forth in the following tabulation:

	USING TYPE I CEMENT	USING TYPE III CEMENT
Key-ways can be removed in.....	12 Hours	6 Hours
Bulkheads can be removed in.....	12 "	6 "
Bottom forms can be removed in.....	18 "	12 "
Retaining Wall forms (10 ft. and under in height) can be removed in.....	48 "	24 "
Sidewall forms can be removed in.....	72 "	36 "
Roof forms (span of 10 ft. or less) can be removed in.....	96 "	48 "
Roof forms (span greater than 10 ft.) can be removed in.....	120 "	60 "

STEEL BARS

(48) Before any bars are set in place they shall be carefully cleaned and shall be free from all dirt, grease, scale, rust flakes or foreign matter, and care shall be taken to keep them in this condition until the concrete is placed.

(49) In setting the bars in the forms the Contractor shall follow the drawings closely as to sizes, fabrication, spacing and placing relative to the surfaces, and where no measurements are given on the drawings, he shall follow instructions given by the Engineer. The bars shall be held securely in place so that they will not be displaced by the tamping of the concrete.

(50) All bars in beams, all cross bars in roofs and inverts shall be of full length. Splicing of bars in walls shall be as indicated on plans. Longitudinal bars shall be lapped not less than forty (40) times the diameter of the Bar. When horizontal bars run farther than the lengths of the forms for any particular section of the work the bulkheads against which the work ends shall be perforated at the proper places and the bars shall project through the same for distances at least equal to the lap specified above; the projecting ends, however, shall be of different lengths, so that in no place will laps in adjoining bars in the same plane occur opposite each other.

(51) Bars will be paid for at the price bid per pound for steel bars, which price shall include the labor of cutting, bending and placing the bars and furnishing and placing the fasteners and supports.

LAYING PIPE DRAINS

(52) Water shall be removed from the excavation before any pipe drains are laid. The pipes and fittings shall be so laid in the trench that after the pipe drain is completed the interior surface of the bottom thereof shall conform accurately to the grades and alignment established by the Engineer. At any stage of construction of a straight stretch between two consecutive manholes the zero, or starting, end of the pipe shall be clearly visible on looking through the pipe from the other end, with the full cross-section of the interior of the pipe in clear view.

(53) Before being set in place each pipe must be thoroughly cleaned and freed of all dirt and examined by the Inspector. It will be rejected if it is found to be defective.

(54) When laying pipe drains the pipe shall be laid and the joints made in the following manner: A suitable primer of the type recommended by the Manufacturer of the Gasket, Joint Sealer shall be brush applied to the bell and spigot or tongue and groove joint surfaces and the end surfaces be allowed to dry and harden. No primer shall be applied over mud, sand or dirt or sharp cement protrusions. The surface to be primed must be clean and dry when primer is applied.

Before laying the pipe in the trench, attach the Plastic Gasket sealer around the tapered tongue or spigot and tapered groove or bell near the shoulder or nub of each pipe joint. Remove the paper wrapper from one side only of the two-piece wrapper on the gasket and press it firmly to the clean, dry pipe joint surface. The outside wrapper is not removed until immediately before pushing the pipe into its final position.

When the tongue or spigot is correctly aligned with the flare of the groove or bell, remove the outside wrappers on the gaskets and pull the pipe home with sufficient force and power (chain hoist, ratchet hoist or winch) etc., to cause the evidence of squeeze out of the gasket material on the inside and outside around the complete pipe joint circumference. Remove any joint material that pushed out into the interior of the pipe that would tend to obstruct the flow. (Pipe shall be pulled home in a straight line with all parts of the pipe on line and grade at all times.) Backfilling of pipe laid with plastic gasket joints may proceed as soon as the joint has been inspected and approved by the Engineer or his representative. Special precautions shall be taken in placing and compacting backfill to avoid damage to the joints.

When the atmospheric temperature is below 60°F., plastic joint seal gaskets shall either be stored in an area warmed to above 70°F. or artificially warmed to this temperature by placing a metal container, which in turn, is placed in hot water. Gaskets shall then be applied to pipe joints immediately prior to placing pipe in trench, followed by connection to previously laid pipe.

Regarding rubber gasket joints, the following procedure must be followed: (1) All pipe ready for laying must be thoroughly cleaned at all joint surfaces. (2) Lubricate recess in the gasket section thoroughly with an approved lubricant. (3) Snap gasket to recess and equalize the tension under the gasket. (4) Thoroughly lubricate sliding surface of both gasket and the inside surface of the bell.

Backfilling of pipe laid with rubber gasket joint may proceed immediately after inspection and approval by the Engineer or his representative. Special precautions shall be taken in placing and compacting backfill to keep pipe in alignment both horizontally and vertically.

Both rubber gasket and the cold applied preformed plastic joint, Ram-Nek or equal must pass an infiltration test which will not exceed five hundred (500) gallons per inch per mile per twenty-four (24) hours.

(55) The Contractor shall furnish and set in the line "Y" or "T" branches as required by the Engineer; see also paragraph No. 4, above.

(56) Whenever pipe laying is stopped, either for the night or for any other cause, the end of the pipe shall be securely closed to prevent the entrance of water, mud or other matter, and shall be secured in such manner as to prevent the end pipe from being dislodged.

JACKING REINFORCED CONCRETE TONGUE AND GROOVE PIPE

(57) If possible pipes shall be jacked up-grade with the groove end of the pipe up-stream. The work shall be performed from a jacking pit and a proper back stop must be provided. A guide for lining the pipe must be accurately set in the jacking pit to establish line and grade. Jacking pressure must be applied by a bearing block or pushing frame to the tongue end of the pipe. Excavation ahead of the lead pipe will be permitted for a distance of approximately one (1) foot.

The jacking must be done in one (1) complete operation without pause or cessation. If the Contractor shall be unable to jack the pipe to completion, he shall complete the pipe installation by excavation from the surface. The Contractor must bear all expenses contingent on such change of method; he will be paid for the pipe finally in place at the price bid in the "Proposal" for each method.

(58) The joints in this pipe line shall be a $\frac{1}{4}$ " layer of bituminous base plastic cement of the type used for sealing leaks in roofs, applied to both the tongue and groove of adjoining pipes just prior to the start of the jacking operations. In addition all inside joints shall be made in accordance with paragraph No. 60 below.

(59) Pipe jacked in place will be paid for at the price bid per linear foot, in the "Proposal", the measurement shall be made horizontally along the center of the pipe from the groove of the first pipe to the tongue of the last jacked pipe. The price bid shall include furnishing the pipe, jacking it into place, removal of excavated material and connecting it by specials (if necessary) to the bell and spigot pipe and in general all the above-mentioned work and furnishing and doing everything necessary to make a complete and satisfactory installation.

INSIDE JOINTS

(60) All inside joints in pipe lines of 27" diameter and larger shall be filled with mortar and finished to a smooth surface. The mortar shall be composed of one (1) part Portland Cement to two (2) parts sand. The cost of this work including all labor and material shall be absorbed in the price per linear foot of the various sizes of pipe on which bids are asked in the "Proposal".

BRICKWORK

(61) All brick, thoroughly wetted, must be laid in full, close, shove joints of mortar. Grouting of joints will not be permitted nor shall horizontal mortar beds be grooved. A reasonable number of bats, not smaller than half bricks will be allowed. In all walls every sixth course shall be a header. If called for on the plans the faces of the walls shall be plastered one-quarter ($\frac{1}{4}$) inch thick, otherwise the faces of walls shall be rubbed with a dry mixture to a neat finish.

(62) Payment for brickwork, unless otherwise specified, will be per cubic yard in place in the work.

MANHOLES AND CATCH BASINS

(63) Manholes over pipe drains shall be constructed at such points and of such dimensions, and in the order and at such times as the Engineer may direct; details of manholes of the various sizes are shown on the plans, the drawings must be followed carefully. Bricks must be laid in full, close, shove joints of mortar, according to best work standards, the mortar being of one part of Portland Cement to three parts of sand (see also paragraphs Nos. 34 and 35, Section "C"). A reasonable number of bats, not smaller than half-bricks, will be allowed; chips of brick will be allowed for filling the angular spaces between the bricks in circular walls. The inside and outside, benches and inverts of manholes shall be plastered with a coat of mortar one quarter ($\frac{1}{4}$) inch thick using an accepted waterproofing compound in the mortar. This waterproofing compound shall be Stearox 100, Anti-Hydro or equal.

(64) Each drain manhole shall ordinarily be completely built as the drain is laid up to it and no drain shall be laid until the manhole at the Zero (or down grade) end has been built to a point above the top of the said drain and the bell piece for the outgoing drain has been built in place; the Engineer may allow this rule to be disregarded when he considers it desirable.

(65) Manholes over Concrete Canals are tentatively located on the plans and shall be constructed at such points and of such dimensions as designated by the Engineer. Details of these manholes are shown on the plans. Bricks must be laid in full, close, shove joints of mortar, according to best work standards. The inside and outside of manholes shall be plastered with a coat of mortar one-quarter ($\frac{1}{4}$) inch thick using an accepted waterproofing compound in the mortar. This waterproofing compound shall be Stearox 100, Anti-Hydro or equal.

(66) In order to drain low spots over canals after partial backfilling, open joint pipe lines may be constructed from the canal manholes. These pipe lines shall be just below the surface of the low spots and shall be surrounded by a thickness of eight (8) inches of clam shells.

The pipe shall be bell and spigot concrete pipe with a maximum diameter of ten (10) inches. The joints shall be open except for a single strand of jute inside the bell. Payment will be by items at the price bid in the "Proposal".

(67) Catch basins shall be constructed at such points and of such dimensions as the Engineer may direct; details of the various sizes of catch basins are shown on plans, these drawings must be followed carefully. Bricks must be laid in full, close, shove joints of mortar, according to best work standards. The mortar used shall be as is specified for manholes, in paragraph No. 63 above; the use of bats is authorized as specified in that same paragraph. The inside and outside walls and inverts of catch basins shall be plastered with a coat of mortar one-quarter ($\frac{1}{4}$) inch thick using an accepted waterproofing compound in the mortar. This waterproofing compound shall be Stearox 100, Anti-Hydro or equal. The concrete used in the inverts shall be Grade "D".

COMBINATION CATCH BASINS

(68) Combination catch basins over pipe drains are tentatively located on the plans and shall be constructed at such points and of such dimensions as designated by the Engineer: details of the various sizes of combination catch basins are shown on the plans, these drawings must be followed carefully. Bricks must be laid in full, close, shove joints of mortar, according to best work standards. The mortar used shall be as is specified for manholes in paragraph No. 63 above; the use of bats is authorized as specified in the same said paragraph. The inside and outside walls and inverts of combination catch basins shall be plastered with a coat of mortar one-quarter (1/4) inch thick using an accepted waterproofing compound in the mortar. This waterproofing compound shall be Stearox 100, Anti-Hydro or equal. Grade "D" concrete shall be used in the inverts and float finished. Combination catch basins shall be paid for at the price bid per vertical foot, for each type, measured from the invert to the top of the cast iron cover, which price shall include excavation, sheeting and bracing, furnishing all materials, including everything from foundation planking to casting, both included, building the combination catch basin, furnishing and placing a capped six (6) inch bell end in the rear wall of the basin, furnishing and placing the short bell pieces for incoming or outgoing drains, backfilling, removing the surplus excavated material and connecting each combination catch basin to open ditches.

DRAIN HOUSE CONNECTIONS

(69) The contractor shall lay six (6) inch pipe drain house connections from designated openings in the drains to such points at or near the property lines as are designated by the Engineer. The standard connection shall have a depth to invert at the property line of not less than two (2) feet.

CLEANOUTS

(70) Cleanouts shall be placed on drain house connections at such points as the Engineer may direct. Details of cleanouts are shown on the plans. Inverts shall be formed of mortar of class "D" concrete and must be finished to a smooth surface.

REARRANGEMENT OF WATER MAINS

(71) Existing water mains crossing Drainage Canals will be arranged as shown on Drawing No. D-2881 and as stated below.

(72) The Engineer will decide whether Case I or Case II crossings are to be used in each case. All pipes and specials will be furnished complete by the Sewerage and Water Board and delivered as near these locations as possible.

(73) For the tie-in by the Sewerage and Water Board's forces of the existing main to the pipe set in its new location, the Contractor will perform all excavation necessary for the new connection and shall uncover as directed the existing water main to a point fifteen (15) feet from the outside wall of the finished canal of widths equal to the nominal diameter of the pipe plus two (2) feet and to a depth six (6) inches below the bottom of the main. This trench in its entirety to be tight sheeted and braced when so ordered by the Engineer.

(74) In cases where the existing water mains are poured into the concrete section, the Contractor shall be required to break out and remove after the tie-in is made, the abandoned section of these water mains and plug all holes or voids to the satisfaction of the Engineer.

(75) Payment for the work listed in the two paragraphs just above will be for excavation only, at the price bid in the "Proposal", which price shall include the above mentioned work as well as backfilling and the hauling away of all surplus material.

UTILITY CROSSINGS

(76) At selected intersections the Contractor will be required to set pipe or casings of the proper diameter as shown on Drawing No. D-2881. The Engineer will decide whether Case I or Case II crossings are to be used in each case. This applies to future structures of the Sewerage and Water Board and to both existing and proposed structures of any other Utility. All casings or pipe and specials will be furnished completely assembled and delivered to each intersection by the Utility in question, e. g., the Sewerage and Water Board of New Orleans, the New Orleans Public Service Inc., the Southern Bell Telephone Co., etc.

(77) Measurement of the length of pipe installed will be outside to outside of the concrete canal walls. Payment will be per linear foot in place, which price will include all handling and setting.

BACKFILL

(78) Backfilling of all excavation shall be done with the most suitable earth developed either at the point of excavation or along the lines of the work. All trash, rubbish, roots or other perishable or objectionable matter shall be removed.

(79) Backfilling of concrete structures shall begin after the seven (7) day curing period. Backfilling of pipe trenches shall begin as soon as the Engineer is satisfied that the joints have been properly made and the location of the specials properly recorded. The best of the excavated material shall be carefully placed in the trench so as not to move the pipe and thoroughly but carefully compacted under and around the pipe up to the center line. The utmost care must be taken not to disturb the pipe by stepping on or near them or by throwing earth upon them from the bank above and not to shift the pipe from its proper position by careless or unskilled ramming around it or by unequal filling on the sides.

(80) Backfilling around manholes shall be done when the Engineer considers the brickwork to be sufficiently hard.

(81) All backfilling shall be thoroughly compacted by tamping, flooding or rolling as the Engineer may direct.

(82) No payment will be made for backfill as such, its cost shall be included in the prices of items on which bids are asked in the "Proposal".

SAND BACKFILL

(83) The Engineer shall have the right to require the excavation to be backfilled, in whole or part, with river sand, or if this is not available with some substitute material satisfactory in his opinion.

(84) Payment for this backfilling with sand will be for the quantities actually placed, well tamped, flooded, rolled or otherwise settled, at the price bid per cubic yard for sand backfilling. This price shall include disposal of the surplus material displaced by the sand.

WOOD CURB

(85) Wood curb shall be installed where ordered by the Engineer to replace similar curb disturbed or removed during construction of new drainage structures, or to protect newly installed catch basins when necessary. Dimensions of the curb shall be 3" less the depth of the ditch; the posts, located not more than 4' centers, shall be 4" x 4" and of a length three (3) times the depth of the curb. All lumber used in this construction is to be rough pine and shall conform to the Specifications of

the Southern Pine Association for short-leaf square edge and sound lumber. The cost of this work, including all nails, fastenings, etc., shall be included in the price bid for wood curb in place. Wood curb will be paid for per one thousand (1000) feet board measure in place. The amount in the "Proposal" is approximate for comparison of proposals.

PAINT FOR METAL AND CONCRETE SURFACES

(86) Bar screens and other metal surfaces shall be given a shop coat of "Rustoleum" No. 769 primer, or equal, and a finishing coat of "Rustoleum" No. 745, or equal. This paint may be applied by brush or by spraying. The metal surfaces must be thoroughly clean and free of rust, old paint and dirt of any kind before any paint is applied.

(87) Paint used for preventing bond between two concrete surfaces shall be a thin coat of Asphalt Emulsion, or equal. One (1) gallon of Asphalt Emulsion shall cover at least 100 square feet of concrete surface.

(88) Asphalt Emulsion, or equal, shall be paid for at the price bid in the "Proposal" for Asphalt Emulsion in place.

MAINTENANCE OBLIGATIONS

(89) When the contract has been completed and tendered for acceptance the Engineer will have it carefully inspected for defects and remeasured to verify the quantities. In order to be acceptable the contract must be in good condition as described here, namely:

All concrete structures shall be true to line and grade, smooth of surface, shall show no cracks or displacement and shall be clean from mud, trash, debris, etc. The pipe drains shall be true to line and grade, there shall be no cracked or broken pipe or fittings in either the main line or the branch lines and there shall be no defective joints. The pipe, manholes, catch basins, cleanouts and other appurtenances shall be free from mud, trash, debris, etc. The manholes, catch basins, cleanouts, etc., shall be properly built in accordance with the drawings and the specifications and shall show no cracks, displacement or other defects in any part of the structure.

(90) Paved or unpaved surfaces disturbed by the work of the Contract shall be in thoroughly good condition as far as the specifications require of the Contractor.

(91) Defects developing during the forty-five (45) days maintenance period shall be repaired by the Contractor at his own expense so that at the end of the said forty-five (45) days the Contract shall be in acceptable condition as described just above.

(92) All such cleaning and repairing is an obligation of the Contractor's and the cost thereof must be included in the prices bid for the various items of the work.

GENERAL SPECIFICATIONS

SECTION F

THE CONSTRUCTION OF WATER MAINS

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F-01 MEASUREMENTS, UNITS, PAYMENTS

(a) Water mains will be measured horizontally over the center of the pipe for each material size. All fittings and valves will be included in this measurement.

Measurements will be from or to:

- (1) Center of special and/or fitting.
- (2) Center of intersecting main.
- (3) Farthest shoulder of bell in a dead end pipe or valve.
- (4) Any combination of the above.

Hydrant leads will be considered as mains and will be measured from the center of the main to the center of the vertical barrel of the hydrant.

(b) The depths of water mains will be measured to the top of the barrel of the pipe from the finished curb or sidewalk surface at its permanent or established grade and is to have the depths of cover as specified below, unless indicated otherwise on the Contract drawings and/or Special Specifications.

In the event the permanent curb grade has not been established by the Department of Streets, it will be set by the Engineer six (6) inches below the average property line profile.

Water mains with internal diameters of less than twelve (12) inches shall be laid so as to have permanent depths of cover of three (3) feet and six (6) inches; mains with internal diameters of twelve (12) inches, through twenty-four (24) inches shall be laid so as to have permanent depths of cover of four (4) feet. Mains larger than twenty-four (24) inches internal diameter shall have permanent depths of cover of five (5) feet. The Board reserves the right to require that these depths shall be exceeded by six (6) inches for not more than ten (10) per cent of the length of the mains laid under this contract without extra charge; any greater depth than is specified herein will be paid for as Extra Excavation.

(c) The Contractor shall not receive extra compensation for overburden or excess filling which must be removed in order to install the pipe at the proper elevation.

(d) Water mains will be paid for at the price bid per linear foot for each material size. This payment will be full compensation for all labor, material, and equipment and for furnishing, hauling and installing the pipes, fittings, valves, etc. as shown in the drawings; for all excavation, sheeting and bracing, all jointing and incidental materials, bedding, wrapping, backfill, compaction and the removal of surplus material. The surface maintenance if not included in other bid items, is to be included in the above.

F-02 EXCAVATION

(a) Excavations shall be open cuts with vertical sides. However, in special cases the Engineer shall permit tunnels or sloping sides. All material excavated shall be placed so as to minimize interference with public travel and to permit access for prosecution and inspection of the work.

(b) The Engineer shall have the authority at any time to require the Contractor to discontinue the use of any excavating machine or other appliance which, in his judgment, is not adapted to the purpose for which it is being used. Dragline operation will not be permitted.

(c) The Contractor shall confine his excavation to the least width that will allow the easy installation of the water main and its appurtenances; this width shall be nine (9) inches from the outside of the barrel of the pipe unless the Engineer shall specifically allow a greater width.

(d) Should any excavation made by the Contractor, in accordance with the plans or by the direction of the Engineer, prove to be unnecessary, it shall be properly backfilled and it will be paid for at the price bid for Extra Excavation.

(e) In case the excavation is carried below grade or beyond the authorized trench width established by the Engineer, the Contractor shall fill the surplus excavation up to grade with clam shells or river sand, and in a manner acceptable to the Engineer. He shall receive no compensation for either the excavation or the backfilling.

(f) The price bid for extra excavation covers all excavations and over-depths which have been authorized by the Engineer and found to be unnecessary for the installation of the water main or its appurtenances. This price includes also the backfilling and disposal of surplus excavated material. If sand and/or shell is specifically ordered by the Engineer to replace all or part of the excavation, then payment will be made for these items at the prices bid in the Proposal. The permissible length of unfilled trench shall not exceed one hundred (100) feet. An open trench in advance of pipe laying operations at the close of the work day will not be permitted.

(g) Where steel or concrete pipe is installed, the Contractor shall dig holes of sufficient size, at joint locations, to provide proper access for the welding, coating, cement grouting and whatever else is necessary for completion of the circumferential joints. This cost shall be included in the price bid for furnishing and installing water mains.

F-03 EXCAVATION TO REMOVE STUMPS, ETC.

(a) If any stumps, roots, logs or other hard or solid masses of matter are encountered at or near the authorized sub-grade within the trench area, such stumps, etc., shall be cut to a further depth of one (1) foot and this void shall be filled with river sand or clam shells. Payment will be at the price bid for Extra Excavation to Remove Stumps and for, either River Sand or Shell Backfill, whichever is applicable.

(b) In the event the Contractor elects to blast stumps, etc., out of his excavation with explosives he must first have the consent of the Engineer and the permission of the municipal authorities. However, he shall receive no compensation for stumps, etc., removed in this manner nor for the river sand or shells required to fill the void made by the blasting.

F-04 SHEETING AND BRACING

(a) Protection of the excavation against caving or settling of the banks shall be the sole responsibility of the Contractor and he shall be responsible for all damage to pavement, buildings or other property caused by his excavation. He shall protect the sides of his excavation by sheeting and bracing as may be necessary. No actions or instructions by the Engineer shall be regarded as his responsibility for the security of the trench or protection for the surrounding area. The full responsibility remains with the Contractor.

(b) The Contractor shall receive no compensation for the use of sheeting and bracing as required to protect his trench. However, should the Engineer require the sheeting and bracing to remain in place, payment will be made at the price bid in the Proposal for this item or at one hundred (100.00) dollars per thousand feet board measure (MFBM) whichever is the lesser of the two prices.

(c) All sheeting left in place shall be cut off a minimum of three (3) feet below the normal ground surface and shall be adequately braced to the approval of the Engineer at or near the point of cut-off.

(d) If the Contractor elects to use steel sheeting, he must first submit a request to the Engineer in writing and enclose sketches showing his proposed bracing and describing his installation procedures.

F-05 FOUNDATION, BEDDING, AND WRAPPING

(a) Cast iron pipe shall be installed on the undisturbed and levelled bottom of the excavation unless sand or shell bedding is specifically ordered by the Engineer. Bell holes shall be dug of sufficient size to permit embedment for the entire length of the pipe barrel and to allow sufficient room for making the joints. The bell holes will not be measured as excavation, their cost shall be included in the price bid for laying water mains.

(b) Polyethylene wrapping is required for all cast iron pipe, fittings, valves, etc. They shall be wrapped with sheets or encased in tubular polyethylene of 6 mil thickness, having a minimum tensile strength of 1200 p. s. i., and a moisture absorption of not more than 0.01% in 24 hours. The polyethylene sheets or casings shall be placed around the pipe with minimum overlaps of six (6) inches and sealed with black polyethylene tape. Payment shall be included in the price bid for furnishing and installing cast iron pipe and fittings.

(c) Asbestos-cement and prestressed concrete pipe shall be laid on a bed of shells, or sand, as specified, for six inches in depth for the full width of the trench and extending to the top of the pipe for sizes twelve (12) inches or smaller and to its center line in sizes larger than twelve (12) inches. The cost of excavation, bedding and wrapping material and the disposal of surplus excavated material shall be included in the price bid for furnishing and installing water mains.

(d) Steel pipe water mains that are coal-tar coated and wrapped shall be laid on a bed of river sand for a depth of six (6) inches below the bottom of the pipe for the full width of the trench and extending up for a distance of one-third of the outside diameter of the pipe. Clam shells may be substituted for the sand bedding wherever cement mortar coated steel pipe is installed. The cost of excavation, bedding and wrapping material and the disposal of surplus excavated material shall be included in the price bid for furnishing and installing steel water mains.

(e) Foundation lumber, if indicated on the contract drawings or ordered by the Engineer, shall be No. 2 Common Southern Pine or equal. Payment will be at the price bid in the proposal for Foundation Lumber in Place.

F-06 CAST IRON WATER MAINS

(a) All cast iron pipe for water mains except flanged joint pipe shall be manufactured in accordance with current ASA Specifications A21-6 or A21-8, and shall have a metal strength of 18,000 p.s.i. Bursting Tensile, and 40,000 p.s.i. Modulus of Rupture. All cast iron pipe shall be thickness Class 22 unless otherwise specified.

(b) Cast iron pipe joints shall be one of the following types:

(1) Caulked lead and Packing joint.

(2) Rubber gasketed joints, as recommended by the pipe manufacturer.

(3) Mechanical joint in accordance with ASA Specifications 21.11 with stainless steel bolts.

(4) Flanged joint according to Current ASA Specifications B-16-1 (Screwed on flanges) or Current ASA Specifications 21.2 (flanges cast integral with the pipe). All flanges shall be ASA Standard Class 125 Ring gaskets shall be 1/16" cloth inserted rubber. Bolts shall meet the requirements of ASA Specification B-16-1.

(c) All cast iron pipes and fittings shall have standard pipe coating outside and be lined with cement lining and seal coat in accordance with Current ASA Specifications A21-4.

(d) Suitable equipment, tools and appliances for the safe and proper handling and laying of the pipes shall be used and care shall be taken to prevent damage to either the pipe coating and/or lining. Any damage to this coating or lining, either before or after installation, shall be repaired by the Contractor to the satisfaction of the Engineer. Any excess of coating or lining in the bells or on the spigots shall be removed before the joint is made.

(e) The pipes shall be thoroughly cleaned before installation and the inside of the pipe shall be kept clean until acceptance of the completed work.

(f) All pipe and fittings found defective after installation shall be removed and replaced by the Contractor at no cost to the Board.

(g) The pipe installation shall conform accurately to the line and grade given by the Engineer.

(h) Lead joints in cast iron pipe shall be made as follows:

The spigot end shall be adjusted in the bell to give a uniform spacing for the joint, which shall be made with an approved packing and soft pig lead. The packing shall be thoroughly and evenly packed into the bell to fill it within one-fourth ($\frac{1}{4}$) inch back of the lead groove. Each joint shall be clean and dry as the lead is poured in one continuous motion. The lead shall be caulked by competent workmen using authorized tools to secure a tight joint without over straining the bells. When caulking is complete, the lead shall be flush with the face of the bell.

(i) Cast iron water mains laid with rubber gasket joints shall be installed as follows:

The pipe shall be placed on a prepared sub-grade and both the interior bell and exterior spigot surfaces shall be thoroughly cleaned and lubricated with an approved lubricant. The pipe shall then be pushed or pulled into its final position in a manner recommended by the pipe manufacturer. After assembly, the Contractor shall check the alignment of the gasket to assure a tight joint.

All defective joints shall be repaired by and at the expense of the Contractor and in a manner approved by the Engineer.

(j) Every dead end of pipe and every unused opening in any fitting shall be closed with a cast iron plug which shall be held in place by a standard lead joint. These plugs shall be lugged or securely braced by planking, to eliminate any possible movement. The cost of furnishing all material and placing these plugs and making the joints shall be included in the price bid for laying the pipe. The bracing of the fittings will be paid for as Foundation Lumber.

(k) The Contractor shall make no charge for cutting pipes in order to bring fittings, valves or hydrants to their designated locations; the cost of cutting the pipes and of hauling away the cut or waste pieces shall be included in the price bid for laying water mains of each size.

(l) Whenever pipe laying is stopped for the night, or for any other cause, the end of the pipe shall be securely closed to prevent the entrance of water, mud or other matter, and shall be secured in such a manner as to prevent the terminal pipe from being dislodged or moved.

(m) No pipe shall be set in place and no joint shall be made with water standing in the trench or bell holes.

(n) Where a tie-in is to be made to an existing pipe or fitting, the Contractor shall excavate and expose the existing fitting or main in order to ascertain its correct location and elevation. This excavation can then be backfilled and its cost shall be included in other items of work. The restoration of pavement shall be by others.

(o) Pipe installation shall commence eight (8) feet from, and at the same elevation as the existing main, or as directed by the Engineer.

F-07 ASBESTOS-CEMENT WATER MAINS

(a) All asbestos-cement pipe for water mains shall be manufactured in accordance with current AWWA Specifications C-400, and the maximum uncombined calcium hydroxide content shall not exceed one (1) per cent. Pipes in sizes of six (6) inches diameter and smaller shall be Class 200, and pipes of sizes eight (8) inches and larger shall be Class 150, unless otherwise specified on Contract Drawings and/or Special Specifications.

(b) All of the requirements of paragraphs F-06 (a) through (o), preceding, except such as are clearly inapplicable because of the difference in the natures of the pipes, shall apply also to the handling, laying and general treatment of water mains of asbestos-cement.

(c) Asbestos-cement pipes will be laid in conjunction with iron specials, fittings, valves or hydrants. No additional payment will be made for furnishing and/or installing these items as shown on the contract drawings.

(d) Joints between two asbestos-cement pipes shall be made with the couplings and gaskets furnished by the manufacturer and according to his directions. Joints between an asbestos-cement pipe and a cast iron bell shall be made with the standard packing and lead joint as described in paragraph F-06 (h), or with a rubber gasket as described in the installation manual furnished by the pipe manufacturer.

(e) Dead ends of asbestos-cement pipe shall terminate with cast iron sleeves and plugs with standard lead joints. These dead ends and other joints of unbalanced pressure shall be braced to compensate for the unbalanced pressure. Payment will be made as described in paragraph F-06 (j).

F-08 IRON FITTINGS

(a) Cast Iron Fittings for Cast Iron and Asbestos-Cement Pipe

(1) Bell and spigot cast iron fittings shall be class 250, manufactured in accordance with Current ASA Specification A21.10 for Short Body Fittings, with joints compatible with the pipe.

(b) Ductile Iron Fittings for Asbestos-Cement Pipe

(1) The ductile iron fittings for asbestos-cement pipe shall be Class 250 conforming to the Current ASTM Specification 339 grade 80-60-03. The fittings shall conform to the Current Specifications ASA A21.10. Both the interior and exterior surfaces of these fittings shall be lined and coated at the factory with a shell of aminecured epoxy resin of an 8 mil minimum thickness.

(c) Coating and Lining

The cast iron fittings shall have a coal tar pitch coating and shall be cement mortar lined in accordance with ASA Specification A.21.4.

(d) Payment

(1) Furnishing and installing all iron fittings and the necessary nuts, bolts, gaskets, caulking material, etc., shall be included in the cost of furnishing and installing pipe when the fittings are shown on the Contract Drawings. Any fittings which are indicated on the drawings and are not used, are the property of the Board and shall be returned to the Board's Central Yard by the Contractor.

(2) Iron fittings which are not indicated on the Contract Drawings and are ordered in place by the Engineer shall be paid per weight as Additional Fittings in Place and will also be included in pipe line measurements. No payment will be made for the additional joint accessories.

F-09 PRESTRESSED CONCRETE WATER MAIN

(a) DESCRIPTION OF PIPE

All prestressed concrete pipe shall conform to the current AWWA C-301 Standard Specifications for "Reinforced Concrete Pipe, Steel Cylinder Type, Prestressed" and as amended by the Special Specifications.

All pipe, fittings and specials shall be designed for a working line pressure of 110 P.S.I. The pipe will be used under conditions that do not exceed the external loads stated in Section 3.2 of the AWWA C-301-64 Standard Specifications, unless so stated in the Special Specifications or shown on the contract drawings.

Where harnessed joints are Specified, they shall be of the Clamped Type Tied joints as manufactured by Price Bros. Company, or similar and equal joint as approved by the Engineer. Joints that are to be harnessed will be shown on the contract drawings and/or will be specified in the Special Specifications.

The Contractor shall submit drawings and schedules showing full details of reinforcement, concrete and joint dimensions for the pipe. No pipe shall be manufactured until the Sewerage and Water Board has checked these drawings.

The Contractor shall also submit for approval, a tabulated layout schedule with reference to the stationing and grade line shown on the Contract Drawings and as further described in Section 1.6.2 of AWWA C-301-64 Standard Specifications.

(b) JOINT DEFLECTIONS

The Contractor's installation schedule for curves formed with square end pipe shall be based on a joint opening of three-eighths (3/8) inch on the outer radius.

Changes in grade and/or line amounting to not more than five (5) degrees shall be made with the use of beveled pipe. Deviations of more than five (5) degrees shall be made with harnessed bends.

Beveled adapters, if required, shall be harnessed or fully welded to the adjacent straight lengths of pipe.

(c) INSTALLATION OF PIPE

Payment for the furnishing and installing of concrete pressure pipe shall be at the price bid in the proposal and as described in Paragraph F-01 (d), and shall include, but is not limited to, the following items:

(1) Furnishing and installing the pipe, fittings and specials.

(2) Interior and exterior grouting of all field installation joints and coating of exposed bolts and nuts. Interior grouting of twenty (20) inch diameter pipe and smaller will not be required.

(3) Excavation and backfill as shown on the Contract Drawings and/or Section F-02 and F-14 of these specifications.

(4) Clam shell bedding.

(d) HANDLING PIPE, FITTINGS AND SPECIALS

The Contractor shall be responsible for all damage incurred to the pipe, fittings, specials and accessories until the final acceptance of the contract. Any that are damaged shall be repaired or replaced to their original condition. No additional payment will be made for these repairs and/or replacements; the entire cost is included in the price bid per linear foot for furnishing and installing prestressed concrete pipe of various sizes.

(e) GRADE AND ALIGNMENT

The pipe installation shall conform to the line and grade as indicated on the Contract Drawings and/or location and grade as established by the Board's Engineer. The nominal depth of cover is described in Paragraph F-01 (b).

The tops of all fittings, specials and beveled end pipe shall be suitably marked by the pipe manufacturer in order that the angular deflection will be in the proper direction. The Contractor shall exercise caution in matching these marks to the markings on adjacent pipes.

(f) CLEANING PIPE

The interior of each piece of pipe, fitting and special shall be swabbed out immediately prior to installation in the trench and shall be clean and free from dirt, debris and other foreign matter when laid; such material shall be prevented from entering the pipe after installation. Whenever pipe laying is stopped at the end of the day's work or for any reason, the open end of the line shall be sealed with a water-tight plug or bulkhead. This plug or bulkhead shall not be removed while water is standing in the trench.

(g) LAYING CONCRETE PIPE

After a length of pipe has been lowered to the prepared sub-grade, all exterior spigot and interior bell surface of the joint to be made shall be thoroughly cleaned, and all joint surfaces well lubricated with a heavy coating of vegetable soap. The pipe shall then be pulled or pushed into final position by means of suitable tackle, chain blocks, or power driven equipment. All instructions and recommendations of the pipe manufacturer relative to gasket installation and other jointing operations shall be observed and followed by the Contractor.

Before the pipe is pulled or pushed "home", steel inserts shall be used to prevent the pipe from entering to the full depth of the bell until the position of the gasket has been gauged and found to be in proper position at all points using a metal "feeler" designed for this purpose. Great care shall be taken in making this inspection, especially on the bottom-half of the joint which cannot be visibly inspected from the outside of the pipe.

In order to prevent the opening or pulling out of a joint, the Contractor shall furnish the necessary equipment and install a pair of "come-alongs" with chains, ropes, or cables and an anchor block set in previously laid pipe at a distance directed by the Engineer. These tension rigs shall be used in conjunction with each other so that constant pull will be applied to recently laid pipe lengths by one "come-along" as the other is released.

(h) OBSTRUCTIONS

The concrete pipe cannot be field cut for re-alignment of line and/or grade due to unforeseen obstructions. The Contractor shall provide all short lengths and/or bends necessary for the complete installation of the water main beyond these obstructions. No additional payment will be made for the short lengths. Payment for the additional bends will

be made at the price bid in the proposal for furnishing and installing additional bends of the size and degree specified. No claim for damages or extra compensation other than as specified above shall accrue to the Contractor from the presence of any obstruction or from any delay due to manufacture or delivery of the additional pipe or specials.

(i) JOINT GROUTING

When the pipe is in its final position, shells shall be placed and compacted to a depth of not less than one (1) foot above the bottom of the pipe except at the joints. The bands provided for jointing purposes shall then be placed around each joint and filled with grout as recommended by the pipe manufacturer. This grout shall consist of one (1) part of Portland cement to two (2) parts of clean mason sand mixed to the proper pouring consistency with potable water. After the joint is complete, additional shells shall be placed up to the center line of the pipe and then select backfill placed for a distance of one (1) foot above the top of the pipe. Excavated material shall then be placed by machine up to the ground elevation. Extreme care shall be taken in backfilling operations at each joint in order to avoid any possible damage to the cement joint. Not less than two (2) lengths of pipe shall be in final position in advance of joint grouting at all times while pipe laying is in progress.

Each inside joint recess for pipe twenty-four (24) inches and larger, shall be completely filled with a stiff mortar mixed in the proportions of one (1) part Portland cement and one (1) part clean mason sand. All joint surfaces shall be damp, but free from surface water, when the mortar is applied thereto. Joints shall be troweled smooth and all excess mortar removed from the pipe.

(j) ADAPTER FITTINGS AND BOLTS

The metal surfaces of all adapters, fittings, bolts and nuts that are exposed after installation shall be covered with a minimum of $\frac{3}{4}$ " cement-mortar grout. The cost of this grouting shall be included in the unit price bid per foot for furnishing and installing the concrete pipe.

(k) THRUST BLOCKS

The Contractor shall construct concrete thrust blocks conforming to the shape and requirements as shown on the Contract Drawings for all horizontal bends, except where specifically ordered omitted by the Engineer. These thrust blocks shall bear against undisturbed soil or proper wood sheeting. The excavation and forming shall be approved by the Engineer before the concrete is poured to insure thrust blocks of adequate size.

The cost of constructing thrust blocks will be paid for at the price bid per cubic yard for "Furnishing and Installing Class 'C' Concrete for the Construction of Thrust Blocks."

(l) BEDDING

The Contractor shall furnish and install the shell bedding six (6) inches below the outer barrel of the pipe and up to the center line unless otherwise shown on the contract drawings. This cost shall be included in the unit price bid for furnishing and installing concrete pipe of various sizes.

No additional payment will be made to the Contractor for additional bedding material brought about by an increased width and/or depth of trench over and above that authorized. If additional excavation is ordered by the Engineer over and above the authorized trench measurements, payment will be made to the Contractor at the prices bid in the Proposal for Extra Excavation and for Additional bedding materials.

(m) FOUNDATION LUMBER

Where adverse soil conditions are encountered or where directed by the Engineer, the Contractor shall also furnish and install foundation lumber as shown on the drawings or as directed by the Engineer. The cost of furnishing and installing the foundation lumber will be paid for at the unit price bid in the Proposal for Foundation Lumber in place.

F-10 STEEL PIPE WATER MAINS

(a) DESCRIPTION OF PIPE

All steel pipe shall conform to the current A.W.W.A. C-201 Standard Specifications for "Fabricated Electrically Welded Steel Water Pipe" and as amended by the Special Specifications.

The steel pipe shall be fully butt-welded in the field as specified herein. The only exception to the butt-welded joint will be flanged joints for valve installation, etc., or special coupling joints as shown on the contract drawings.

(b) INSTALLATION

Payment for furnishing and installing of steel pipe shall be at the price bid in the proposal and as described in paragraph F-01 (d), and shall include, but is not limited to, the following items:

(1) The cost of furnishing and installing steel pipe and fittings of the specified wall thickness as required by the drawings; coated and lined as specified.

(2) The welding, lining and coating of field installation joints.

(3) Excavation and backfill according to F-02 and F-14 of these specifications.

(4) Furnishing and installing patches for air vent cocks, and the drilling and tapping for two (2) inch corporation cocks which shall be furnished by the Board.

(5) Furnishing and installing access openings as indicated on contract drawings.

(6) Furnishing and installing bedding material as indicated on the contract drawings.

(7) Furnishing, installing and coating all bolts, nuts, gaskets, etc., required for all joints necessary to complete installing, testing, sterilizing and tying-in to the system.

(8) Sandblasting and coating valves installed in the steel pipe line as specified in Paragraph F-12 (f) of these specifications.

(c) HANDLING

All steel pipe shall be handled and transported with equipment provided with stout wide canvas or rubber-nylon

fiber slings and wide padded skids or cradles, designed, constructed and arranged to prevent damage to the pipe coating. Bare cables, chains, hooks, metal bars or narrow skids or cradles will not be permitted to come in contact with the coating or lining.

(d) GRADE AND ALIGNMENT

Pipe installation shall conform to the line and grade as indicated on the Contract Drawings, and confirmed by the Engineer. The nominal depth of cover is described in paragraph F-01 (b). The Contractor will not be permitted to trim pipes in order to correct faulty alignment or grade except with special permission of the Engineer. If this permission is granted, all such trimming shall be cut to the correct angle and beveled for butt-welding. All cost for such cutting and trimming shall be borne by the Contractor.

(e) OBSTRUCTIONS

The Engineer has the authority to require the cutting of abutting pipe ends to produce the angular deflection required to avoid conflict with obstructions. When so directed, the Contractor shall cut the ends to the proper angle, shall bevel the edges so that proper welds can be made and shall weld the joint. For these trims, he will be paid the price bid in the proposal for Additional Trims for steel pipe. No payment will be made for cuts required for the installation of the pipe. No payment will be made for cuts required for the installation of the pipe according to line and grade as shown on the Contract Drawings.

Where a short length of pipe is to be field measured and cut as indicated on the Contract Drawings, or is required to correct any measurements shown on the drawings that prove to be in error, the Contractor will be paid at the price bid for Additional Cuts for steel pipe. If the cut adds a joint to the original plan, the Contractor will be paid the price bid for Additional Coating of joints.

(f) BEDDING

The Contractor shall furnish and install river sand bedding material six (6) inches below the outer barrel and up to one-third (1/3) of the outside diameter of the pipe unless otherwise shown on the contract drawings. The entire cost of this bedding shall be included in the unit price bid for installing steel pipe of various size.

No additional payment will be made to the Contractor for additional bedding material brought about by an increased width and/or depth of trench over and above that authorized. If additional excavation is ordered by the Engineer over and above the authorized trench measurements, payment will be made to the Contractor at the prices bid in the Proposal for Extra Excavation and for Additional Bedding Materials.

(g) FOUNDATION LUMBER

Where adverse soil conditions are encountered, and/or when so directed by the Engineer, the Contractor shall furnish and install foundation lumber as shown on the Contract Drawings, or as directed by the Engineer. Payment will be made at the unit price bid for Foundation Lumber in place.

(h) LINING AND COATING

All steel pipe shall be lined and coated as shown on the contract drawings and/or specified in the Special Specifications. The lining and coating, as required, shall be in accordance with the following specifications and as amended by the Special Specifications:

Coal tar lining shall be in accordance with the current A.W.W.A. C-203 Specifications for "Coal-Tar Enamel Protective Coatings for Steel Water Pipe".

Coal tar coatings shall be in accordance with the current A.W.W.A. C-203 Specifications for "Coal-Tar Enamel Protective Coatings for Steel Water Pipe", Section A 1.4 therein, "Coal-Tar Enamel, Fibrous Glass Material and Bonded Asbestos Felt Wrap".

Cement mortar coating shall be in accordance with the current A.W.W.A. C-205 Specifications, "Cement Mortar Protective Lining and Coating for Steel Water Pipe".

(i) FIELD WELDING

Steel pipe shall be placed on prepared subgrade with the longitudinal seams in the upper quadrant (but not top center) of the pipe, or as directed by the Engineer. Field welding at circumferential joints in thirty-six (36) inch and smaller diameter pipes shall be made from the outside of the main. For pipes with internal diameters of more than thirty-six (36) inches, the circumferential weld shall be made from the inside and/or outside of the pipe as per Special Specifications. All field welds shall be in conformity with the current A.W.W.A. C-206 Standard Specifications, for "Field Welding of Steel Water Pipe Joints".

(j) FIELD LINING AND COATING

After welding is completed, all interior joints shall be thoroughly cleaned, primed and coated with hot applied coal tar enamel in accordance with Section 4 of A.W.W.A. C-203-62 Standard Specifications and/or as amended by Special Specifications. Any request for the use of alternates must be approved in writing by the Engineer. The joints on the exterior of the pipe shall be thoroughly cleaned, primed and coated with hot applied coal-tar enamel, fibrous glass mat and bonded asbestos-felt wrap in accordance with Section 4 of A.W.W.A. C-203-62 Standard Specifications. If the steel pipe has a cement mortar coating, the Contractor shall coat the joint with cement mortar in accordance with Section A-3 of A.W.W.A. C-205 Standard Specifications or as amended by the Special Specifications. The cost of lining and coating of all field welded joints shall be included in the price bid for furnishing and installing steel pipe of various sizes. For the purpose of heating coal tar enamel for field application, a portable tar heating kettle equipped with a mechanical agitator, and a legible dial thermometer indicating the correct temperature must be used. The kettles are to be heated with kerosene or butane-propane type fuel, and are to be kept clean of coke or other deposits. When a build-up of enamel occurs in the carrying buckets, or when so directed by the Engineer, the Contractor shall clean buckets by sand blasting or replace them with new buckets. Burning or scraping out of the enamel will not be permitted.

F-11 WATER MAINS OF OTHER MATERIALS

(a) When the Board shall call for water mains of unusual design or material, such water mains shall be built according to the Special Specifications provided in each case. All items of these General Specifications shall govern such installations except when necessarily superseded by the Special Specifications.

F-12 VALVES, VALVE BOXES AND MANHOLES

(a) Whether valves are furnished by the Contractor at the prices bid, or whether they are furnished free to the Contractor by the Board, no charge shall be made for setting them in place. Valves of twelve (12) inch size or less shall be set vertical, and be covered by cast iron, valve boxes or brick manholes as indicated on Contract Drawings, and as shown on drawing No. 6179-F-2. Valve boxes, set in place, will be paid for at the price bid per pound for Miscellaneous Iron Castings. Valve manholes will be paid for at the price bid for each manhole complete with castings. Valves and valve manholes of sixteen (16) inch size or over will be as called for in the Special Specifications and Drawings.

Gate valves ranging in size from 4" through 12" shall conform to the current Sewerage and Water Board specifications. Gate valves 16" and larger shall be double-disc and shall conform to the current A.W.W.A. C-500 Specifications. They shall be non-rising stem and shall open by turning clockwise.

(b) The cost of installing the valve, including transporting the valve to the job site (if furnished by the Board), the furnishing and installing of all materials, including bolts, nuts, gaskets, lead, etc., for a complete installation shall be included in the unit price bid for furnishing and installing the pipe. Valves shall be included in pipe line measurements.

(c) All essential details of construction of brick manholes are shown in drawings accompanying these specifications. Bricks must be laid in full, close, shove joints of mortar, according to best work standards. The mortar being of one (1) part of Portland Cement to three (3) parts of sand. (See correlated paragraphs of Section C) A reasonable number of bats, not smaller than half-bricks, will be allowed; chips of brick will be allowed for filling the angular spaces between the bricks in the circular walls.

(d) The standard valve manhole is circular in plan, four (4) feet in internal diameter at the bottom and two (2) feet, eight and five-eighths (8-5/8) inches in internal diameter, for the last nine (9) inches, at the top of the brickwork, just below the manhole cover frame (as shown on drawing No. 6179-F-2). Manholes shall be plastered on the inside with a thin coating of mortar of equal parts of cement and sand, worked to a smooth surface, or with a brushed-on wash of neat cement, at the option of the Engineer.

(e) All manholes shall rest on a concrete slab conforming to drawing No. 6179-F-2. The tensile strength of the concrete shall be 3000 psi and the reinforcing steel shall conform to the requirements of Section C of these General Specifications. Manhole slabs shall rest on a six (6) inch layer of compacted shells and shall be placed as shown on the drawing.

(f) Whenever a valve is installed along a steel main that is coal-tar coated, the valve shall be sand-blasted to remove all previously applied shop coatings and shall be coal-tar primed and coated as specified in paragraph F-10 (j). Valve portals shall be sealed with plywood during the sand-blast operation.

F-13—HYDRANTS

(a) Hydrants shall be set as shown in Drawing No. 6179-F-2. If the contract requires the Contractor to furnish and install the hydrants the price bid for furnishing and installing hydrants shall include the excavation, setting it in place, making the joint connecting it to the hydrant lead, furnishing and placing all the shells, foundation and bracing materials, everything required for the firm and stable installation of the hydrant in the location designated. If, on the other hand, the contract provides that the hydrants are to be furnished free to the Contractor by the Board, the price bid for setting hydrants shall also include hauling them from the Board's Central Yard to the site of the work.

(b) The hydrants furnished by the Contractor shall comply with the description given in Section C of these General Specifications or as amended by the Special Specifications.

F-14 BACKFILLING

(a) Backfilling of water mains shall begin as soon as the Engineer is satisfied that the pipe is laid to line and grade, the necessary fittings properly placed and braced, the joints completed and the authorized backfill material compacted under and around the pipe, all in the manner shown on the contract drawings. Select backfilling material shall then be placed by hand and compacted in six (6) inch layers to a depth of one (1) foot above the top of the pipe. The refilling of the trench above the aforesaid level shall be done by mechanical or other methods, which will not be injurious to the water main or to other sub-surface structures. Competent workmanship and the utmost care are to be exercised by the Contractor to obtain the maximum consolidation and compaction.

(b) Backfilling around manholes shall be done when the Engineer considers the brickwork to be sufficiently hard. Selected excavated material shall then be placed and compacted in six (6) inch layers to a depth of one (1) foot above the top of the pipe. The backfilling above this point shall be completed according to paragraph F-14 (a) above.

(c) The Engineer shall have the authority to direct that excavations shall be wholly or partially backfilled with sand, stabilized shells or other materials acceptable to the Engineer. The Contractor shall furnish, deliver and place this material where and as directed by the Engineer. He will be paid the price bid for the backfill material selected. No payment will be made for the removal of the surplus excavated material.

F-15 TESTING

(a) Before any water mains are accepted by the Board, they shall be tested under the supervision of the Engineer at a hydrostatic pressure of one hundred (100) pounds per square inch for not more than twenty-four (24) consecutive hours, and any defective work revealed by the test must be repaired by the Contractor in a manner acceptable to the Engineer. The entire cost of the test, including pumps, gauges, connecting pipes, etc., and the repairing of the faults disclosed by the test are to be included in the price bid for laying water mains. The Board will furnish water for the test without cost to the Contractor.

(b) The amount of leakage under the stated pressure shall not exceed one hundred (100) gallons for twelve (12) inch and smaller diameter pipe, and fifty (50) gallons for pipe larger than twelve (12) inches in diameter per twenty-four (24) hours, for each mile of pipe, for each inch of inside diameter.

(c) All trench areas prior to testing shall be completely backfilled and compacted: all valve boxes and valve manhole castings shall be set to proper grade, and all hydrants shall be plumb and shall have proper exposure and with the steamer nozzle facing the street.

No testing will be permitted until the Contractor has complied with all the above requirements.

F-16 STERILIZING AND CONNECTING TO THE SYSTEM

(a) After the test described in paragraph F-15 has been satisfactorily completed, the forces of the Sewerage and Water Board will furnish all material, labor, tools and equipment to sterilize the newly installed mains and for making the tie-ins to the existing system. The Board will be responsible for everything within limits of the tie-in, including surface restoration. In the event that these procedures are revised, the changes will be covered in the Special Specifications.

(b) The Contractor shall not open or close any valve in the previously existing water distribution system nor shall he open or close any valve set in this contract after water pressure has been turned on. Only the properly authorized employees of the Sewerage and Water Board will be allowed to open or close such valves.

F-17 MAINTENANCE OBLIGATIONS

(a) Leaks or other defects that may develop in any portion of the newly installed main and/or appurtenances before the tie-in is made, will be the Contractor's responsibility. He shall promptly repair such leaks or other defects without any additional compensation from the Board even though the materials or construction found defective have already passed inspection. If the contract provides that the valves and hydrants are to be furnished free by the Board then the valves and the hydrants needed for such replacement will also be furnished by the Board just as for the original installation. However, a careful examination of the damaged items will be made by the Engineer and the Contractor will be charged with the value of those items which the Engineer decides have been damaged through the fault of the Contractor.

(b) When the contract has been completed and tendered for acceptance and the pipe has been tested as specified in paragraph F-15, and found acceptably free from leaks, the Engineer will have it carefully inspected for defects and remeasured to verify item quantities. In order to be acceptable, the contract must be in a condition as herein described:

1. There shall be no detectable leaks.
2. There shall be no defects in valves, hydrants or other appurtenant parts of the water distribution system.
3. Manholes shall be built in accordance with Contract Drawings and Specifications and shall be clean and show no defects in any part of the structure.
4. Paved, partially improved or unimproved surfaces disturbed by the work of the contract shall be restored to a thoroughly good and stable condition as required by the Specifications. These surfaces shall be jointly inspected and accepted by representatives of the Contractor, the Sewerage and Water Board, and the Department of Streets.

(c) All cleaning and restoration of surface areas is an obligation of the Contractor and the cost thereof shall be included in the prices bid for the various items of the work.

(d) The percentage of the value of the work done, as stated in the Special Specifications, will be withheld by the Board for not less than the forty-five (45) days mentioned in Section A, Paragraph 63, of the General Specifications.

During the forty-five (45) day period the Contractor is responsible for the maintenance of all surfaces disturbed by the work of this contract, whether unimproved, partially improved or paved, and shall retain them in good condition to the satisfaction of the Engineer. Maintenance of the surface after this forty-five (45) day period will be the responsibility of others.

The Contractor is also responsible for all work attributed to defective material and workmanship for a period of one (1) year from the day the acceptance of the Contract is recorded in the office of the Recorder of Mortgages. The Board shall be protected by the Contractor's performance bond which shall remain in effect for this period.

Any leaks or other defects, attributable to defective material or workmanship, developing in the water main within this three hundred and sixty-five (365) day period after the contract is accepted by the Board and recorded in the office of the Recorder of Mortgages shall be repaired by the Board's forces and charged to the Contractor.

If the Contractor fails to reimburse the Board within forty (40) days after billing, the Board will demand payment from the bonding company.