CONTRACT DOCUMENTS
AND
TECHNICAL SPECIFICATIONS

FOR THE

MARVIN BRAUD PUMP STATION
NEW PUMP AND AUTOMATED SCREEN CLEANER AT PUMP BAY NO. 7

FOR THE

EAST ASCENSION CONSOLIDATED

GRAVITY DRAINAGE DISTRICT 1

PARISH PROJECT NO. – EAD 1830782753

JANUARY, 2016

BURK-KLEINPETER, INC.

ENGINEERS, ARCHITECTS, PLANNERS, ENVIRONMENTAL SCIENTISTS

STATE OF LOUISIANA
MICHAEL G. JACKSON
REG. No. 15148
REGISTERED
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

JAN 25, 2016

4176 CANAL STREET
NEW ORLEANS, LA.
BKI NO. 10401

SET NO._____

AND
TECHNICAL SPECIFICATIONS

FOR THE

MARVIN BRAUD PUMP STATION
NEW PUMP AND AUTOMATED SCREEN CLEANER AT PUMP BAY NO. 7

FOR THE

EAST ASCENSION CONSOLIDATED

GRAVITY DRAINAGE DISTRICT 1

PARISH PROJECT NO. – EAD 1830782753

JANUARY, 2016

BURK-KLEINPETER, INC.

ENGINEERS, ARCHITECTS, PLANNERS, ENVIRONMENTAL SCIENTISTS

4176 CANAL STREET
NEW ORLEANS, LA.
BKI NO. 10401

TABLE OF CONTENTS

DIVISION 0 - BID DOCUMENTS

00 11 16 INVITATION FOR BIDS
00 21 13 INSTRUCTIONS TO BIDDERS
00 41 33 BID FORM
00 45 01 BIDDER'S REPRESENTATION
00 45 19 NON COLLUSION AFFIDAVIT
00 45 36 EQUAL OPPORTUNITY
00 45 43 CORPORATE RESOLUTION
00 52 13 AGREEMENT
00 61 13 PERFORMANCE BOND
00 61 13.16 PAYMENT BOND
00 61 26 BID BOND
00 72 00 GENERAL CONDITIONS
00 73 00 SUPPLEMENTARY CONDITIONS
00 74 00 SPECIAL PROVISIONS

DIVISION 01 - GENERAL REQUIREMENTS

01 10 99 MISCELLANEOUS REQUIREMENTS
01 11 00 SUMMARY OF WORK
01 14 16 COORDINATION
01 22 00 UNIT PRICES
01 25 00 SUBSTITUTION PROCEDURES
01 26 63 CHANGE ORDERS
01 29 00 APPLICATIONS FOR PAYMENT
01 32 16 CONSTRUCTION AND PROGRESS SCHEDULES
01 32 23 SITE CONDITIONS SURVEY
01 32 33 CONSTRUCTION PHOTOGRAPHS
01 33 00 SUBMITTAL PROCEDURES
01 39 19 PROJECT MEETINGS
01 42 00 REFERENCE STANDARDS AND DEFINITIONS
01 42 13 ABBREVIATIONS AND SYMBOLS
01 45 00 QUALITY CONTROL
01 51 00 TEMP UTILITIES
01 60 00 MATERIAL AND EQUIPMENT
01 66 00 STORAGE AND PROTECTION
01 71 13 MOBILIZATION
01 71 23 FIELD ENGINEERING AND SURVEYING
01 73 29 CUTTING AND PATCHING
01 77 00 CONTRACT CLOSEOUT
01 78 39 PROJECT RECORD DOCUMENTS

DIVISION 02 – EXISTING CONDITIONS

02 41 19 SELECTIVE STRUCTURE DEMOLITION

DIVISION 03 - CONCRETE

NOT USED

DIVISION 04 – MASONRY

NOT USED

DIVISION 05 - METALS

NOT USED

DIVISION 06 – WOODS, PLASTICS AND COMPOSITES

NOT USED

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 21 00 THERMAL INSULATION
07 41 13 METAL ROOF PANELS
07 72 00 ROOF ACCESSORIES

DIVISION 08 - OPENINGS

NOT USED

DIVISION 09 - FINISHES

09 91 23 PAINTING

DIVISION 10 - SPECIALTIES

NOT USED

DIVISION 11 - EQUIPMENT

11 05 13	COMMON MOTOR REQUIREMENTS FOR EQUIPMENT
11 82 35	CLIMBER SCREEN CLEANER AND RACK

DIVISION 12 - FURNISHINGS

NOT USED

DIVISION 13 - SPECIAL CONSTRUCTION

NOT USED

DIVISION 14 - CONVEYING EQUIPMENT

NOT USED

DIVISION 21 – FIRE SUPPRESSION

NOT USED

DIVISION 22 - PLUMBING

22 05 23	GENERAL DUTY VALVES FOR PLUMBING PIPING
22 05 29	HANGERS AND SUPPORTS FOR PLUMBING PIPING EQUIPMENT
22 10 00	VERTICAL PUMP
22 10 01	PUMP MODEL TEST
22 11 13	FACILITY PIPING AND VALVES
22 15 13	GENERAL SERVICE COMPRESSED AIR PIPING
22 15 15	ENGINE EXHAUST PIPING AND SPECIALTIES
23 11 13	FACILITY FUEL-OIL PIPING

DIVISION 26 - ELECTRICAL

26 05 19	LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 23	CONTROL VOLTAGE ELECTRICAL POWER CABLES
26 05 26	GOUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
26 05 44	SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING
26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 27 26	WIRING DEVICES
26 28 13	FUSES
26 28 16	ENCLOSED SWITCHES AND CIRCUIT BREAKERS

DIVISION 31 – EARTHWORK

31 23 16 EXCAVATION
31 35 00 SLOPE PROTECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 92 19 SEEDING AND FERTILIZING

DIVISION 33 – UTILITIES

33 45 00 GEAR REDUCERS

DIVISION 41 – MATERIAL PROCESSING AND HANDLING EQUIPMENT

41 65 10 ENGINE
41 65 11 GRID COOLER

APPENDIX 1 – METAL BUILDING SHOP DRAWINGS

End of Table of Contents

SECTION 00 11 16

INVITATION FOR BIDS

Sealed bids for construction of the following project will be received by the Ascension Parish Government Purchasing Office, 615 E. Worthey Street, Gonzales, LA 70737 (mailing address P.O. Box 2392, Gonzales, LA 70707-2392), until 10:00 a.m. local time on March 10, 2016 at which time and place bids will be publicly opened and read. Bids received after 10:00 a.m. local time will not be accepted and will be returned to the Bidder unopened.

PROJECT NAME:	MARVIN BRAUD PUMP STATION NEW PUMP AND AUTOMATED SCREEN CLEANER AT PUMP BAY NO. 7
LOCATED IN:	ASCENSION PARISH, LOUISIANA
TYPE OF WORK:	DRAINAGE PUMP STATION CONSTRUCTION
LICENSE CLASSIFICATION:	HEAVY MUNICIPAL & PUBLIC WORKS
OWNER:	EAST ASCENSION PARISH CONSOLIDATED DRAINAGE DISTRICT 1 42077 CHURCHPOINT ROAD GONZALES, LOUISIANA 70737
PROPOSAL GUARANTY:	5% of amount of bid (payable to the East Ascension Parish Consolidated Drainage District 1)
ENGINEER:	BURK-KLEINPETER, INC. 4176 CANAL ST. NEW OREANS, LA 70119 PHONE: 504-486-5901 FAX: 504-483-6228
PLANS:	$150.00 {Non-refundable}
PRE-BID CONFERENCE:	MARCH 1, 2016 @ 1:00p.m. DEPARTMENT OF PUBLIC WORKS 42077 CHURCHPOINT RD. GONZALES, LA, 70737.

Copies of Specifications, Bid Documents, Contract Documents, and Construction Plans for use in preparing Bids may be obtained from the Engineers at the address stipulated above upon deposit of One Hundred Fifty ($150.00) Dollars for each set of Documents

In no event shall Bid Forms be issued later than twenty-four (24) hours prior to the hour and date set for receiving bids. Reference directed to R.S. 37:2163.

Contractors desiring to bid shall submit to the Engineers, with their request for Plans, evidence that they

hold State License of proper classification and in full force and effect.

Bid security in the amount of five percent (5%) of the Total Bid, including alternates, must accompany each Bid, and shall be made payable to the Owner.

The successful bidder will be required to execute a performance bond and a payment bond in the full amount of the contract.

The Owner reserves the right to reject any and all Bids and to waive informalities, and to reject nonconforming, non-responsive, or conditional Bids.

This bid can also be submitted online at http://www.centralauctionhouse.com/rfp.php?cid=69.

ASCENSION PARISH GOVERNMENT
TOMMY MARTINEZ, PARISH PRESIDENT

ADVOCATE – 02/11/16,02/18/16, 02/25/16
CHIEF - 02/11/16,02/18/16, 02/25/16
WEEKLY - 02/11/16,02/18/16, 02/25/16

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

PART 1 – GENERAL

1.1 CROSS REFERENCE TO PRIMARY STATEMENTS.

A. Definitions, requirements, and limitations affecting the bidding are contained in the various Contract Documents, and are not necessarily repeated in these instructions. The following is a partial list of applicable provisions and their locations:

1. Availability of Land	General Conditions and Division 1
2. Bonds and Insurance	General and Supplemental Conditions
3. Definitions	General and Supplemental Conditions
4. Detailed Description of the Work	Division 1
5. Liquidated Damages	Agreement and Special Provisions
6. Laws and Regulations	General and Supplemental Conditions
7. Retainage	Agreement and Special Provisions
8. Subsurface Investigations	General and Supplemental Conditions

1.2 QUALIFICATIONS OF BIDDERS

A. Bidders may be required to submit evidence that they have a practical knowledge of the particular Work bid upon, and that they have the financial resources to complete the proposed Work.

B. In determining the Bidder's qualifications, the following factors will be considered: Work previously completed by the Bidder and whether the Bidder (a) maintains a permanent place of business, (b) has adequate plant and equipment to do the Work properly and expeditiously, (c) has the financial resources to meet all obligations incident to the Work, and (d) has appropriate technical experience. In accordance with Louisiana Public Contract Law (38:2281), preference will be given to bidders domiciled in Louisiana.

C. Each Bidder may be required to show that he has handled former work so that no just claims are pending against such work. No Bid will be accepted from a Bidder who is engaged on any work which would impair his ability to perform or finance this Work.

1.3 LOUISIANA LICENSE REQUIREMENTS

A. Only Bids of Contractors licensed under LSA R.S. - 37:2150 et seq., will be considered. Licensing is supervised by the Louisiana Licensing Board for Contractors, Baton Rouge, Louisiana. Contractors desiring to bid shall submit with their Bids evidence that they hold a valid Heavy or Municipal and Public Works Construction license.

1.4 FAMILIARIZATION WITH THE WORK

A. Before submitting his Bid, each prospective Bidder shall familiarize himself with the Work, the site where the Work is to be performed, local labor conditions and all laws, regulations and other factors affecting performance of the Work.

B. He shall carefully correlate his observations with requirements of the Contract Documents and otherwise satisfy himself of the expense and difficulties attending performance of the Work.

C. The submission of a Bid will constitute a representation of compliance by the Bidder. There will be no subsequent financial adjustment for lack of such familiarization.

D. Each Bidder shall visit the site of the Work and completely inform himself relative to construction hazards and procedure, the availability of lands, the character and quantity of surface and subsurface materials, and utilities to be encountered, the arrangement and condition of existing structures and facilities, the character of construction equipment and facilities needed for performance of the Work, and facilities for transportation, handling, and storage of materials and equipment. All such factors shall be properly investigated and considered in the preparation of the Bid.

1.5 PRE-BID CONFERENCE

A. A Pre-Bid Conference will be held at 1 P.M. on Tuesday, March 1, 2016 at 42077 Churchpoint Rd., Gonzales, LA 70737. Representatives of Burk-Kleinpeter, Inc. will be present to discuss the Project and answer questions. Bidders, subcontractors, and suppliers are encouraged to attend and participate in the conference. A site visit shall follow. Contractors and subcontractors shall be responsible for all matters discussed at the Pre-Bid Conference as well as decisions made at that time.

1.6 INTERPRETATIONS

A. All questions about the meaning or intent of the Contract Documents shall be submitted to the Engineer in writing.

B. Replies will be issued by Addenda, mailed or delivered to all parties recorded by the Engineer as having received the bidding documents. Addenda will be issued at least seventy two (72) hours (excluding weekends and holidays) prior to the time stated for opening bids.

C. Questions received less than seven (7) calendar days prior to the date for opening Bids will not be answered.

D. Only answers furnished by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

1.7 ADDENDA

A. Addenda will be mailed, faxed, e-mailed or delivered to all who are known by the Engineer to have received a complete set of Bidding Documents.

B. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

C. No Addenda will be issued later than seventy-two (72) hours prior to the time for receipt of Bids except for either withdrawing the request for Bids or postponement of the date for receipt of Bids.

D. Each Bidder shall ascertain prior to submitting his Bid that he has received all Addenda issued, and he shall acknowledge their receipt in his Proposal.

1.8 TAXES AND PERMITS

A. Attention is directed to the requirements of the General and Supplementary Conditions regarding payment of taxes and obtaining permits. All taxes that are lawfully assessed against Owner or Contractor in connection with the Work shall be paid by the Contractor. The bid prices shall include all such taxes and the costs of all required permits.

1.9 BID SECURITY

A. The amount of bid security is stated in the Advertisement to Bid. The required security must be in the form of a certified or bank cashier's check or a bid bond. If used, the bid bond must be executed by a surety meeting the requirements set forth in General Conditions.

B. The bid security shall be made payable without condition to the East Ascension Consolidated Drainage District 1, hereinafter referred to as Owner.

C. The bid security may be retained by and shall be forfeited to the Owner as liquidated damages if the Bid is accepted and a contract based thereon is awarded and the Bidder shall fail to enter into a contract in the form prescribed, with legally responsible sureties, within ten (10) calendar days after contract has been delivered to the Bidder by the Owner.

1.10 RETURN OF BID SECURITY

A. The bid security of the successful Bidder will be retained until he has executed the Agreement and furnished the required Contract Security, whereupon checks furnished as bid security will be returned; if he fails to execute and deliver the Agreement and furnish the required Contract Security within ten (10) calendar days after the Contract has been delivered to the Bidder by the Owner, Owner may annul the Notice of Award and the bid security of that Bidder will be forfeited.

B. The bid security of any Bidder whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the seventh day after the executed Agreement is delivered by Owner to Contractor and the required Contract Security is furnished but not to exceed ninety (90) calendar days after the Bid opening.

C. Checks furnished as bid security by other Bidders will be returned within seven (7) calendar days of the Bid opening.

D. See Section 00 74 00 for additional provisions.

1.11 CONTRACT TIME

A. The Contract Time is an essential part of the contract and it will be necessary for each Bidder to satisfy Owner of his ability to complete the Work within the time set forth in the Agreement. Provisions for delays, liquidated damages, and extensions of time are set forth in the General and Supplementary Condition.

1.12 SUBCONTRACTORS AND SUPPLIERS

A. Within seven (7) calendar days after Bids are opened, the apparent low Bidder, and any other Bidder so requested, shall submit a list of all Subcontractors he expects to use in the Work.

B. Particular consideration will be given to the qualifications of each Subcontractor proposed to perform more than ten percent (10%) of the Work. An experience statement with pertinent information as to similar projects and other evidence of qualification shall be furnished for each named Subcontractor, as requested by the Owner.

C. If Owner or Engineer after due investigation has reasonable objection to any proposed Subcontractor, he may before giving the Notice of Award request the apparent low Bidder to submit an acceptable substitute without an increase in his Bid. If the apparent low Bidder declines to make any such substitution, Notice of Award shall not be given to such bidder, but in declining to make substitution he will not thereby sacrifice his bid security.

D. Any Subcontractor so listed and to whom Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to the Owner and Engineer.

E. Contractor shall not be required to employ any subcontractor against whom he has reasonable objection.

F. The use of subcontractors listed by the Bidder and accepted by the Owner prior to the Notice of Award will be required in the performance of the Work.

G. The list of subcontractors shall also include the suppliers and manufacturers of principal items of materials and equipment the Bidder expects to use in the Work.

1.13 PREPARATION OF BIDS

A. Bound sets of Contract Documents are for the Bidder's information only and should not be used when submitting bids. All papers bound with or attached to the Proposal Form are a necessary part thereof and must not be detached.

B. The Bidder shall use the unbound Proposal Form (issued with the original bidding documents or by Addendum) for the submission of bids. Necessary copies of this form will be furnished for bidding. Proposal Forms must be made out in ink or typed. Contractor shall submit one (1) original bid and one (1) copy. Illegibility or ambiguity therein may constitute justification for rejection of the bid.

C. Bids by Corporations must be executed in the corporate name by the signature of the president or vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The state of incorporation shall be shown below the corporate name.

D. Bids by partnerships must be executed in the partnership name and signed by a partner; title and the official address of the partnership must be shown below the signature.

E. Bids by joint ventures shall be signed by each participant in the joint venture or by an authorized agent of each participant.

F. The names of all persons signing must also be legibly printed below the signature. A Bid by a person who affixes to his signature the word "president", "secretary", "agent", or other designation without disclosing his principal may be held to be the Bid of the individual signing.

G. When requested by Owner, evidence of the authority of the person signing shall be furnished.

H. All blank spaces in the Bid Form shall be filled. A bid price shall be indicated for the Total Base Bid.

I. The bid shall contain an acknowledgment of receipt of all Addenda, the numbers and dates of which shall be filled in on the Bid Form.

J. No alterations in Bids, or in the printed forms therefor, by erasures, interpolations, or otherwise will be acceptable unless each such alteration is signed or initialed by the Bidder; if initialed, Owner may require the Bidder to identify any alteration so initialed.

K. The Total Base Bid shall be based on the Work as indicated on the drawings and as specified.

L. The Total Base Bid price quoted for the Work shall be stated in figures and in words. The price quoted in the Bid Form shall include all costs necessary for the complete performance of the work in full conformity with the conditions of the Contract Documents, and shall include all applicable Federal, State, Parish, Municipal or other taxes.

M. The Bidder’s Representation, Non Collusion Affidavit, and Equal Opportunity Clause are not required to be submitted at the time of Bid. These documents shall be submitted by

10 a.m. on the third business day following the opening of bids, otherwise the bid may be considered informal.

1.14 SUBMISSION OF BIDS.

A. Each Bid and accompanying documents shall be enclosed in duplicate in a sealed opaque envelope or wrapping, addressed to:

East Ascension Consolidated Gravity Drainage District 1
42077 Churchpoint Road
Gonzales, Louisiana 70737

B. Bids shall be identified on the outside with the Bidder's name; return address; the words "Bid for MARVIN BRAUD PUMP STATION NEW PUMP AND AUTOMATIC SCREEN CLEANER AT PUMP BAY NO. 7"; the project number; and the state license number of the bidder, unless otherwise excepted by law.

C. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof.

D. Bids shall be deposited at the designated location prior to the time and date for receipt of Bids indicated in the Advertisement to Bid, or the modified time and date indicated by Addendum. Bids received after the time and date for receipt of Bids will be returned unopened.

E. Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

F. Oral, telephone, or telegraph Bids will not receive consideration.

G. No Bidder may submit more than one Bid. Multiple Bids under different names will not be accepted from one firm or association.

H. This bid can also be submitted online at http://www.centralauctionhouse.com/rfp.php?cid=69.

1.15 MODIFICATION AND WITHDRAWAL OF BIDS.

A. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the termination of the acceptance of Bids.

B. See Section 00 74 00 for additional provisions.

1.16 BIDS TO REMAIN OPEN

A. All Bids shall remain open for forty-five (45) calendar days after the day of the Bid opening. Owner shall release bids and return bid securities as specified in this section under "Return of Bid Security".

1.17 AWARD OF CONTRACT

A. Owner shall award a contract to the Bidder who, in Owner's judgment, is the lowest responsive, responsible Bidder. Owner reserves the right to reject any or all Bids, to waive informalities, and to reject non-conforming, non-responsive, or conditional Bids. See Section 00 74 00 for additional provisions.

B. In evaluating Bids, Owner shall consider the qualifications of the Bidders, and whether or not the Bids comply with the prescribed requirements. Owner may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material), and may reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

C. If the contract is awarded, Owner shall give the apparent successful Bidder a Notice of Award within sixty (60) calendar days after the date of the Bid opening.

1.18 EXECUTION OF THE AGREEMENT

A. Engineer will furnish to Contractor six copies of the Agreement and other Contract Documents bound therewith. Within twelve (12) calendar days, Contractor shall execute the Agreement, insert executed copies of the required bonds and power of attorney and submit all copies to the Owner. The date of contract on the Agreement and Bond forms shall be left blank for filling in by Owner. The certification date on the power of attorney also shall be left blank for filling in by Owner.

B. Owner will execute all copies, insert the date of contract on the Agreement, Bonds, and power of attorney, and return all copies to Engineer for review and distribution. Distribution of signed copies shall be two copies each to Owner and Contractor, and one copy each to Surety and Engineer.

C. Contractor will file one complete copy of the executed Contract Documents with the Ascension Parish Clerk of Court.

1.19 COPIES OF CONTRACT DOCUMENTS

A. Copies of the Bidding Documents and Contract Documents, consisting of the drawings and Project Manuals may be examined without charge in the office of Burk-Kleinpeter, Inc., located at 4176 Canal Street, New Orleans, Louisiana and may be procured by Contractors who are duly qualified upon payment of **One Hundred Fifty Dollars ($150.00)** per set. All sets furnished will be non-refundable. Requests for mailing Contract Documents will be handled by Federal Express only, provided the addressee supplies his account number, "street" address, and submits a check for the deposit plus a $10.00 processing fee.

B. The Contractor to whom a contract is awarded will be furnished 4 copies of the specifications and the drawings, together with all Addenda thereto.

1.20 LOCAL MATERIALS AND FIRMS.

A. By statutory authority, preference is hereby given to materials, supplies, and provisions produced, manufactured, or grown in Louisiana, quality being equal to articles offered by competitors outside of the State (LSA R.S. - 38:2251), and preference is hereby given to firms doing business in the State of Louisiana (LSA R.S. - 38:2253).

1.21 LOCAL LABOR AND FIRMS.

A. By statutory authority, preference is hereby given to resident contractors doing business in the State of Louisiana in accordance with Louisiana Public Contract Law (38:2281).

1.22 BOND QUALIFICATIONS

A. All bid, performance, and payment bonds for contracts with the East Ascension Consolidated Drainage District 1 shall be provided by a company or companies with at least a "A" or better financial rating according to the latest A.M. Best Company rating.

END OF SECTION

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: **Ascension Parish Government Purchasing Department**
120 East Railroad Street
Gonzales, Louisiana 70737
(Owner to provide name and address of owner)

BID FOR: **MARVIN BRAUD PUMP STATION INSTALLATION OF NEW PUMP AND AUTOMATED SCREEN CLEANER AT PUMP BAY NO. 7**
(*Owner to provide name of project and other identifying information)*

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Burk-Kleinpeter, Inc. _____ and dated: January, 2016
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A _____ Dollars ($ _____)

Alternate No. 2 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A _____ Dollars ($ _____)

Alternate No. 3 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A _____ Dollars ($ _____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

** If someone other than a corporate officer signs for the Bidder/Contractor, a copy of a corporate resolution or other signature authorization shall be required for submission of bid. Failure to include a copy of the appropriate signature authorization, if required, may result in the rejection of the bid unless bidder has complied with La. R.S. 38:2212(B)5.

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218.A is attached to and made a part of this bid.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: **Ascension Parish Government Purchasing Department**
120 East Railroad Street
Gonzales, Louisiana 70737
(Owner to provide name and address of owner)

BID FOR: **MARVIN BRAUD PUMP STATION INSTALLATION OF NEW PUMP AND AUTOMATED SCREEN CLEANER AT PUMP BAY NO. 7**
(Owner to provide name of project and other identifying information)

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ Slope Protection			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
001	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ Mobilization			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
002	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ Sheet Pile Wall Removal			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
003	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ Roof Removal and Replacement Over Pump Bay No. 7			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
004	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ Compressed Air Piping			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
005	1	LUMP SUM		

DESCRIPTION	☒ Base Bid or ❑ Alt.# ___ Fuel Supply and Return Piping			
REF. NO.	QUANTITY:	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
006	1	LUMP SUM		

DESCRIPTION	☒ Base Bid or ❑ Alt.# ___ Climber Type Cleaner & Trash Rack			
REF. NO.	QUANTITY:	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
007	1	LUMP SUM		

DESCRIPTION	☒ Base Bid or ❑ Alt.# ___ Pump, Gear, Engine, Gridcoolers & Accessories			
REF. NO.	QUANTITY:	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
008	1	LUMP SUM		

DESCRIPTION	☒ Base Bid or ❑ Alt.# ___ Electrical Work			
REF. NO.	QUANTITY:	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
009	1	LUMP SUM		

DESCRIPTION	☒ Base Bid or ❑ Alt.# ___ Pump Model Test			
REF. NO.	QUANTITY:	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
010	1	LUMP SUM		

DESCRIPTION	☒ Base Bid or ❑ Alt.# ___ Miscellaneous Site Work			
REF. NO.	QUANTITY:	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
011	1	LUMP SUM		

DESCRIPTION	☒ Base Bid or ❑ Alt.# ___ Earthwork			
REF. NO.	QUANTITY:	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
012	1	LUMP SUM		

SECTION 00 45 01

BIDDER'S REPRESENTATION

By the act of submitting a bid for the proposed contract, the Bidder represents that:

1. The Bidder and all subcontractors the Bidder intends to use have carefully and thoroughly reviewed the drawings, specifications and other construction contract documents and have found them free from ambiguities and sufficient for the purpose intended; further that,

2. The Bidder and all workmen, employees and subcontractors the Bidder intends to use are skilled and experienced in the type of construction represented by the construction contract documents bid upon; further that,

3. Neither the Bidder nor any of the Bidder's employees, agents, intended suppliers or subcontractors have relied upon any verbal representations, allegedly authorized or unauthorized from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the bid figure; and further that,

4. The bid figure is based solely upon the bid documents and the construction contract documents and properly issued written addenda and not upon any other written representation.

_____
Contractor's Name

_____
By (Signature)

_____
Typed or Clearly Printed Name and Title

_____
Date

END OF SECTION

SECTION 00 45 19

NON-COLLUSION AFFIDAVIT

STATE OF LOUISIANA
PARISH OF ASCENSION

BEFORE ME, the undersigned authority, personally came and appeared _____, who after being by me duly sworn, deposed and said that he is the fully authorized _____ of _____ (hereinafter referred to as bidder) the party who submitted a bid for _____ _____which bid was received by Ascension on _____ and said affiant further said:

(1) That bidder 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 bidder 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 bidder; and

(2) That no part of the contract price received by bidder 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 bidder whose services in connection with the construction of the public building or project were in the regular course of their duties for bidder.

(3) Said bid is genuine and the bidder has not colluded, conspired or agreed directly or indirectly with any other bidder to offer a sham or collusive bid.

(4) Said bidder has not in any manner directly or indirectly agreed with any other person to fix the bid price of affiant or any other bidder, or to fix any overhead profit or cost element of said bid price, or that of any other bidder, or to induce any other person to refrain from bidding.

(5) Said bid is not intended to secure an unfair advantage of benefit from Ascension Parish or in favor of any person interested in the proposed contract.

(6) All statements contained in said bid are true and correct.

(7) Neither affiant nor any member of his company has divulged information regarding said bid or any data relative thereto to any other person, firm or corporation.

SWORN TO AND SUBSCRIBED
BEFORE ME THIS _____
DAY OF _____, **20**_____

Signed: _____

_____
Title

_____
NOTARY PUBLIC

END OF SECTION

SECTION 00 45 36

CONTRACTOR EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY

CERTIFICATION OF BIDDER
REGARDING EQUAL EMPLOYMENT OPPORTUNITY

Instructions

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause, and if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven (7) calendar days after bid opening. No contract shall be awarded unless such report is submitted.

Certification by Bidder

Name and Address of Bidder (include zip code)

---

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. (Executive Orders 11246 and 11375 or preceding Executive Orders 10925 and 11114.)

   Yes____ No____

---

2. Compliance reports were required to be filed in connection with such contract or subcontract. (Reports due under the requirements contained in 40 CRF, Part C, 8.11.)

Yes____ No____

3. Bidder has filed all compliance reports due under applicable instructions, including Monthly Employment Utilization Report (257).

Yes____ No____None Required____

4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended?

Yes____ No____

Name and Title of Signer (please type)

Signature Date

END OF SECTION

SECTION 00 45 43

CORPORATE RESOLUTION

Excerpt from minutes of meeting of the board of directors of

_____.

At the meeting of directors of _____ ,

duly noticed and held on _____ ,**20**____, a quorum being there present, on motion duly made and Seconded. It was:

RESOLVED. That _____, be and is hereby appointed, constituted and designated as agent and attorney-in-fact of the corporation with full power and authority to act on behalf of this corporation in all negotiations, bidding, concerns and transactions with the Parish of Ascension or any of its agencies, departments, employees or agents, including but not limited to, the execution of all bids, papers, documents, affidavits, bonds, sureties, contracts and acts and to receive and receipt therefor all purchase orders and notices issued pursuant to the provisions of any such bid or contract, this corporation hereby ratifying, approving, confirming and accepting each and every such act performed by said agent and attorney-in-fact.

I hereby certify the foregoing to be a true and correct copy of an excerpt of the minutes of the above dated meeting of the board of directors of said corporation, and the same has not been revoked or rescinded.

_____
Secretary-Treasurer

_____
Date

END OF SECTION

SECTION 00 52 13

AGREEMENT

THIS AGREEMENT, made and executed in SIX (6) original copies on this _____ day of

_____ in the year 20____ by and between:

East Ascension Parish Consolidated Drainage District 1, Louisiana

(hereinafter called the OWNER) and

_____

(hereinafter called the CONTRACTOR)

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1 WORK.

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents in conjunction with:

Marvin Braud Pump Station – New Pump and Automated Screen Cleaner at Pump Bay No. 7

Article 2. ENGINEER.

The Plans and Specifications have been prepared by Burk-Kleinpeter, Inc., 4176 Canal St. New Orleans, LA 70119 who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

Article 3. CONTRACT TIME.

3.1 The Work will be substantially completed within **365** calendar days from the date when the Contract Time commences to run as provided in paragraph 2.3 of the General Conditions.

3.2 Liquidated Damaqes. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and the OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER the amount of Five Hundred ($500.00) Dollars for each day

that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete.

Article 4. CONTRACT PRICE.

4.1 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds the sum of (subject to adjustment as provided in the Contract Documents):

_____

_____ Dollars ($_____).

Article 5. PAYMENT PROCEDURES.

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

5.1 Progress Payments. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, once each month during construction. All progress payments will be on the basis of progress of the Work measured by the schedule of values established in paragraph 2.9 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

5.2 Pursuant to LA R.S. - 38:2248 (Public Contract Law), Owner shall withhold retainage from each progress payment until payment is due under the terms and conditions governing substantial completion or final payment. Retainage shall be ten percent of the amount of work completed to date if the contract amount is up to $500,000 and five percent of the work complete to date if the contract amount is over $500,000.

5.3 Final Payment. Upon final completion and acceptance of the Work in accordance with paragraph 14.13 of the General Conditions and Supplementary Conditions SC-9. OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER

Article 6. CONTRACTOR'S REPRESENTATIONS.

In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

6.1 CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Work site, locality and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

6.2 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities. No additional

examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.3 of the General Conditions.

6.3 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

6.4 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

Article 7. CONTRACT DOCUMENTS.

The Contract Documents which comprise the contract between OWNER and CONTRACTOR, attached hereto and made a part hereof, consist of the documents listed in Table of Contents, and the documents identified below.

a. Bid
b. Bid Bond
c. Agreement
d. Payment Bond
e. Performance Bond
f. Notice of Award
g. Notice to Proceed
h. Drawings prepared by Burk-Kleinpeter, Inc., 163 Sheets dated January, 2016.
i. Specifications prepared by Burk-Kleinpeter, Inc. dated January, 2016.

Article 8. MISCELLANEOUS.

8.1 Terms used in this Contract which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

8.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

8.3 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Contract the day and year first above written.

OWNER	CONTRACTOR
East Ascension Parish Consolidated Drainage District 1,	_____
_____	_____
Federal Identification No.	Federal Identification No.
_____	_____
By _____	By _____
Title Chairman, EAPCDD1	Title _____
Attest_____	Attest _____
Address for giving notices	Address for giving notices
42077 Churchpoint Road	_____
Gonzales, LA 70707-1659	_____
	License No._____
	Agent for service of process:
	_____
	(If CONTRACTOR is a corporation, attach evidence of authority to sign.)
	(SEAL)

SECTION 00 61 13

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that we,_____ _____of____ _____, hereinafter referred to as "Contractor", a corporation organized under the laws of the State of _____and _____ _____, as "Surety", a corporation organized under the laws of the State of _____and authorized to transact business in the State of Louisiana, are held and firmly bound unto the Ascension Parish, , Louisiana, hereinafter referred to as "Owner", in the penal sum of_____ Dollars and _____Cents($_____), for the payment of which sum, well and truly to be made, we bind ourselves and our heirs, executors, administrator, successors, and assigns, jointly and severally, by these presents:

WHEREAS, on the _____day of _____, **20**_____, the Contractor entered into a written contract with the Owner for furnishing materials, supplies, and equipment not furnished by the Owner, construction tools, equipment, and plant, and the performance of all necessary labor, for and in connection with the construction of certain improvements described in the attached contract documents; and

WHEREAS, it was a condition of the contract award by the Owner that these presents be executed by the Contractor and Surety;

NOW, THEREFORE, if the Contractor shall, in all particulars, well, duly, and faithfully observe, perform, and abide by each and every covenant, condition, and part of the said contract, and the conditions, specifications, drawings, and other contract documents thereto attached or, by reference, made a part thereof, according to the true intent and meaning in each case, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that if the Contractor shall fail to pay all just claims and demands by, or in behalf of, any employee or other person, or any firm, association, or corporation, for labor performed or materials, supplies, or equipment furnished, used, or consumed by the Contractor or his subcontractors in the performance of the work, then the Surety will pay the full value of all such claims or demands in any total amount not exceeding the amount of this obligation, together with interest as provided by law.

THE UNDERSIGNED SURETY, for value received, hereby agrees that no extension of time, change in, addition to, or other modification of the terms of the contract or work to be performed thereunder, or of the specifications or other contract document, shall in any way affect its obligation on this bond, and the Surety does hereby waive notice of any such extension of time, change, addition, or modification.

IN TESTIMONY WHEREOF, the Contractor has hereunto set his hand and the Surety has caused these presents to be executed in its name and its corporate seal to be affixed by its attorney-in-fact at

_____ on this the _____ day of _

_____, **20**_____.

ATTEST

_____ _____(SEAL)

Witness of Principal CONTRACTOR

By:_____

Principal

By:_____

Title:_____

_____

_____

Address

ATTEST

_____ _____

Witness as to Surety SURETY COMPANY

By:_____(SEAL)

Attorney-in-Fact

By:_____

Title:_____

_____

_____

Address

(Accompany this bond with attorney-in-fact's authority from the Surety Company certified to include the date of the bond)

END OF SECTION

SECTION 00 61 13.16

PAYMENT BOND

_____

as Principal, and _____
a surety company or companies authorized to do business in Louisiana, as Surety, are bound, in solido, unto

_____and unto all subcontractors, workmen, and furnishers of materials and equipment, jointly in the sum of

_____

_____DOLLARS ($_____),
payable in lawful money of the United States, and to this bond do obligate their heirs, successors and assigns. In the case of co-sureties, co-sureties assume an obligation in the sum of

_____

_____DOLLARS ($_____),

for _____ and

_____

_____DOLLARS ($_____),

The consideration for this bond is such, that if the Principal shall perform this contract, made and entered into on the _____ day of _____,20____,

To construct the project entitled:

_____Marvin Braud Pump Station – Pump Station Expansion Project_____

_____

Parish _____Ascension_____, consisting of _____

_____
according to the stipulations in said contract attached hereto and made a part hereof, pay all sums due on materials and supplies used and for wages earned by workmen employed on the work; this obligation shall be void; otherwise to remain in effect.

It is agreed by the parties that this bond is given in accordance with Louisiana Revised Statutes of 1950, Title 38, Chapter 10.

Witness our hands and seals, this___ day of _____. 20____.

Witnesses

_____ _____
Principal

_____ By_____

_____
Typed or Printed Name

_____ _____
First Surety

_____ By_____(Seal)
Attorney-in-Fact

_____
Typed or Printed Name

_____ _____
Second Surety

_____ By_____(Seal)
Attorney-in-Fact

_____
Typed or Printed Name

I certify that I am as of the date of this bond a licensed Resident Agent of Louisiana in good standing with the Louisiana Insurance Commission and authorized to countersign this bond on behalf of the Surety or Sureties.

First Surety	Second Surety
By _____	By_____
_____ Typed or Printed Name	_____ Typed or Printed Name
_____ Typed or Printed Name	_____ Typed or Printed Name
_____ Address	_____ Address

SECTION 00 61 26

BID BOND

KNOW ALL MEN BY THESE PRESENTS that we, the undersigned,

_____ as PRINCIPAL, and

_____ as SURETY, are held and firmly bound unto the East Ascension Parish Consolidated Drainage District 1, hereinafter called the "OWNER", in the penal sum of:

_____DOLLARS

($_____) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Bid dated _____, 20_____, for

_____

_____

NOW, THEREFORE, if the PRINCIPAL shall not withdraw said Bid within the period specified therein after the opening of the same or, if no period be specified, within ninety (90) days after the said opening, and shall within the period specified therefor or, if no period be specified, within ten (10) days after the prescribed forms are presented to him for signature, enter into a written Contract with the OWNER in accordance with the Bid as accepted, and give bond with good and sufficient SURETY or sureties, as may be required, for the faithful performance and proper fulfillment of such Contract; or in the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such bond within the time specified, if the PRINCIPAL shall pay the OWNER the difference between the amount specified in said Bid and the amount for which the OWNER may procure the required work or supplies, or both, if the latter be in excess of the former, then the above obligation shall be void and of no effect, otherwise, to remain in full force and virtue.

Surety bonds shall be procured according to Louisiana State Law. Any surety bond written for a public works project shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an A rating in the latest printing of the A.M. Best's Key Rating Guide to write individual bonds up to ten percent of policyholder's surplus as shown in the A.M. Best's Key Rating Guide.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals this _____ day of _____, 20____, the name and corporate

seal of each corporate party being hereto affixed and these presents signed by its undersigned representative, pursuant to authority of its governing body.

In Presence of:

_____
(Individual Principal)

_____
(Business Address, including Zip Code)

_____ _____
(Partnership) (Seal)

_____
(Business Address, including Zip Code)

ATTEST: BY:_____

_____ _____
(Corporate Principal)

_____ _____

(Business Address, including Zip Code)

BY:_____
AFFIX CORPORATE SEAL

ATTEST:

_____ _____
(Corporate Surety)

_____ _____

BY:_____
AFFIX SEAL

Countersigned:

BY:_____
Attorney-in-Fact*

State of _____

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the _____, Secretary of the Corporation names as PRINCIPAL in the within bond; that _____ who signed the said bond on behalf of the PRINCIPAL was then _____ of said Corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of this governing body.

_____
(Corporate Seal)

_____
(Title)

_____
* Power-of-Attorney for person signing for surety company must be attached to bond.

END OF SECTION

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General Contractors of America

Construction Specifications Institute
Edited And Adopted For Use By Burk-Kleinpeter, Inc.
February 2003

EJCDC C-700 Standard General Conditions of the Construction Contract.
Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

Copyright ©2002

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314

American Council of Engineering Companies
1015 15th Street, N.W., Washington, DC 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

TABLE OF CONTENTS

Page

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY 6
1.01 *Defined Terms* 6
1.02 *Terminology* 8
ARTICLE 2 - PRELIMINARY MATTERS 9
2.01 *Delivery of Bonds and Evidence of Insurance* 9
2.02 *Copies of Documents* 9
2.03 *Commencement of Contract Times; Notice to Proceed* 9
2.04 *Starting the Work* 9
2.05 *Before Starting Construction* 9
2.06 *Preconstruction Conference* 9
2.07 *Initial Acceptance of Schedules* 9
ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE 10
3.01 *Intent* 10
3.02 *Reference Standards* 10
3.03 *Reporting and Resolving Discrepancies* 10
3.04 *Amending and Supplementing Contract Documents* 11
3.05 *Reuse of Documents* 11
3.06 *Electronic Data* 11
ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS 11
4.01 *Availability of Lands* 11
4.02 *Subsurface and Physical Conditions* 12
4.03 *Differing Subsurface or Physical Conditions* 12
4.04 *Underground Facilities* 13
4.05 *Reference Points* 13
4.06 *Hazardous Environmental Condition at Site* 13
ARTICLE 5 - BONDS AND INSURANCE 14
5.01 *Performance, Payment, and Other Bonds* 15
5.02 *Licensed Sureties and Insurers* 15
5.03 *Certificates of Insurance* 15
5.04 *Contractor's Liability Insurance* 15
5.05 *Owner's Liability Insurance* 16
5.06 *Property Insurance* 16
5.07 *Waiver of Rights* 17
5.08 *Receipt and Application of Insurance Proceeds* 17
5.09 *Acceptance of Bonds and Insurance; Option to Replace* 18
5.10 *Partial Utilization, Acknowledgment of Property Insurer* 18
ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES 18
6.01 *Supervision and Superintendence* 18
6.02 *Labor; Working Hours* 18
6.03 *Services, Materials, and Equipment* 18
6.04 *Progress Schedule* 19
6.05 *Substitutes and "Or-Equals"* 19
6.06 *Concerning Subcontractors, Suppliers, and Others* 20
6.07 *Patent Fees and Royalties* 21
6.08 *Permits* 21
6.09 *Laws and Regulations* 21
6.10 *Taxes* 22
6.11 *Use of Site and Other Areas* 22
6.12 *Record Documents* 22
6.13 *Safety and Protection* 22
6.14 *Safety Representative* 23
6.15 *Hazard Communication Programs* 23

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

6.16 *Emergencies* ... 23
6.17 *Shop Drawings and Samples* ... 23
6.18 *Continuing the Work* ... 24
6.19 *Contractor's General Warranty and Guarantee* ... 24
6.20 *Indemnification* ... 25
6.21 *Delegation of Professional Design Services* ... 25
ARTICLE 7 - OTHER WORK AT THE SITE ... 26
7.01 *Related Work at Site* ... 25
7.02 *Coordination* ... 26
7.03 *Legal Relationships* ... 26
ARTICLE 8 - OWNER'S RESPONSIBILITIES ... 26
8.01 *Communications to Contractor* ... 26
8.02 *Replacement of Engineer* ... 26
8.03 *Furnish Data* ... 26
8.04 *Pay When Due* ... 26
8.05 *Lands and Easements; Reports and Tests* ... 27
8.06 *Insurance* ... 27
8.07 *Change Orders* ... 27
8.08 *Inspections, Tests, and Approvals* ... 27
8.09 *Limitations on Owner's Responsibilities* ... 27
8.10 *Undisclosed Hazardous Environmental Condition* ... 27
8.11 *Evidence of Financial Arrangements* ... 27
ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION ... 27
9.01 *Owner's Representative* ... 27
9.02 *Visits to Site* ... 27
9.03 *Project Representative* ... 27
9.04 *Authorized Variations in Work* ... 28
9.05 *Rejecting Defective Work* ... 28
9.06 *Shop Drawings, Change Orders and Payments* ... 28
9.07 *Determinations for Unit Price Work* ... 28
9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work* ... 28
9.09 *Limitations on Engineer's Authority and Responsibilities* ... 28
ARTICLE 10 - CHANGES IN THE WORK; CLAIMS ... 29
10.01 *Authorized Changes in the Work* ... 29
10.02 *Unauthorized Changes in the Work* ... 29
10.03 *Execution of Change Orders* ... 29
10.04 *Notification to Surety* ... 29
10.05 *Claims* ... 29
ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK ... 30
11.01 *Cost of the Work* ... 30
11.02 *Allowances* ... 31
11.03 *Unit Price Work* ... 32
ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES ... 32
12.01 *Change of Contract Price* ... 32
12.02 *Change of Contract Times* ... 33
12.03 *Delays* ... 33
ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK ... 33
13.01 *Notice of Defects* ... 33
13.02 *Access to Work* ... 33
13.03 *Tests and Inspections* ... 34
13.04 *Uncovering Work* ... 34
13.05 *Owner May Stop the Work* ... 34
13.06 *Correction or Removal of Defective Work* ... 34
13.07 *Correction Period* ... 35
13.08 *Acceptance of Defective Work* ... 35
13.09 *Owner May Correct Defective Work* ... 35
ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION ... 36
14.01 *Schedule of Values* ... 36
14.02 *Progress Payments* ... 36
14.03 *Contractor's Warranty of Title* ... 37
14.04 *Substantial Completion* ... 38

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

14.05 *Partial Utilization* 38
14.06 *Final Inspection* 38
14.07 *Final Payment* 38
14.08 *Final Completion Delayed* 39
14.09 *Waiver of Claims* 39
ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION 40
15.01 *Owner May Suspend Work* 40
15.02 *Owner May Terminate for Cause* 40
15.03 *Owner May Terminate For Convenience* 40
15.04 *Contractor May Stop Work or Terminate* 41
ARTICLE 16 - DISPUTE RESOLUTION 41
16.01 *Methods and Procedures* 41
ARTICLE 17 - MISCELLANEOUS 41
17.01 *Giving Notice* 41
17.02 *Computation of Times* 41
17.03 *Cumulative Remedies* 41
17.04 *Survival of Obligations* 42
17.05 *Controlling Law* 42
17.06 *Headings* 42

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms**

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

*** See SC-1.01 of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents, or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed* *****

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work* ******

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction* *******

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review**:**

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided

*** See SC-2.03 of Supplemental Conditions**
**** See SC-2.04 of Supplemental Conditions**
***** See SC-2.05B of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party..

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

*****A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

******B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

1. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or

*** See SC-4.02A of Supplemental Conditions**
**** See SC-4.02B of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

*****A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not

*** See SC-4.04.A of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

5.01 *Performance, Payment, and Other Bonds*

*****A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

******B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

*******A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

********B. The policies of insurance required by this Paragraph 5.04 shall:

*** See SC-5.01.A of Supplemental Conditions**
**** See SC-5.01.B of Supplemental Conditions**
***** See SC-5.04.A of Supplemental Conditions**
****** See SC-5.04.B of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

*****A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

~~**B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and~~

*** See SC-5.06.A of Supplemental Conditions**
**** See SC-5.06.B of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

~~Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.~~

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

*****D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

******E. ~~If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.~~

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order .

*** See SC-5.06.D of Supplemental Conditions**
**** See SC-5.06.E of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

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

*****B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

******A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer,

*** See SC-6.02.B of Supplemental Conditions**
**** See SC-6.03.A of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

*1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

* **See SC-6.04.A.1 of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified , and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued . No acceptance by Owner of any such Subcontractor, Supplier, or other individual or

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer,, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

*B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

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

* **See SC-6.04.A.1 of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:* Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals , any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

*****A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

******B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

*** See SC-7.02.A of Supplemental Conditions**
**** See SC-7.02.B of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative**

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the

*** See SC-9.03 of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment , a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be respon-

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

sible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A.Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

*E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

---

* **See SC-10.05.E of Supplemental Conditions**

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment,

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

B. Cash Allowances

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation , overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays**

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times , or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

*** See SC-12.03.F and SC-12.03.G of Supplemental Conditions**

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously.

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments

*****1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

*** See SC-14.02.A.1 of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

*****C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

*** See SC-14.02.C Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, , Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

*****A. Application for Payment

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

*****C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*******

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with

*** See SC-14.07.A of Supplemental Conditions**

*** See SC-14.07.C of Supplemental Conditions**
**** See SC-14.08 of Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

*C. ~~If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:~~

~~1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or~~

~~2. agrees with the other party to submit the Claim to another dispute resolution process, or~~

~~3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.~~

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

*** See SC-16.01.C Supplemental Conditions**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings**

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

*** See SC-17.07 of Supplemental Conditions.**

Copyright © 2002 National Society of Professional Engineers for EJCDC. All rights reserved.

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

SUPPLEMENTARY CONDITIONS
TO THE
STANDARD GENERAL CONDITIONS
OF THE
CONSTRUCTION CONTRACT
(C-700, 2002 EDITION)

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (C-700, 2002 Edition) and other provisions of the Contract Documents as indicated herein. All provisions which are not so amended or supplemented remain in full force and effect. Revision Date: February 2003.

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (C-700, 2002 Edition, as edited for use by Burk-Kleinpeter, Inc. [February 2003]) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

SC-1.01

The items used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract (C-700, 2002 Edition, as edited for use by Burk-Kleinpeter, Inc. [February 2003]) have the meanings assigned to them in the General Conditions.

Add the following definitions:

> "Easement/Servitude - The burden placed on property due to specified rights to its use. The terms may be used interchangeably."
>
> "Record Drawing - The engineering plans, amended for the changes incorporated during construction."
>
> "Special Provision - The part of the Contract Documents which emphasizes, specifies or advises the Contractor of special items or circumstances particular to the project or amends or supplements General Conditions and Supplementary Conditions."

SC-2.03.

Refer to paragraph GC 2.03. The seventh line of this paragraph is amended to read as follows:

> ".....later than the one hundred-twentieth (120th) day after day of Bid opening....."

and so amended paragraph 2.03. remains in effect.

SC-2.04.

Amend the first sentence of paragraph 2.04. of General Conditions to read as follows:

> "CONTRACTOR shall start to perform the Work within ten (10) calendar days of the date when....."

and so amended paragraph 2.04. remains in effect.

SC-2.05.B

Add the following paragraph SC-2.05.B at the end of this Section.

> "2.05.B. *Evidence of Insurance:* All liability, property and other insurance specified in Contract Documents shall be purchased and maintained by CONTRACTOR as set forth in Article 5 (unless otherwise specified in the Special Provisions). CONTRACTOR shall deliver the required insurance certificates for the project to the ENGINEER within seven (7) calendar days of the execution of the Agreement. Failure to comply with this requirement will delay issuance of the Notice to Proceed."

SC-4.02.A.

Amend the first line of paragraph 4.02.A. of General Conditions to read as follows:

> "The Special Provisions identify:"

and so amended paragraph 4.02.A. remains in effect.

SC-4.02.B.

Amend the fifth line of paragraph 4.02.B. of General Conditions to read as follows:

> "Such “technical data” is identified in the Special Provisions."

and so amended paragraph 4.02.B. remains in effect.

SC-4.04.A.

Amend the last sentence of paragraph 4.04.A. of General Conditions to read as follows:

> "Unless it is otherwise expressly provided in the Special Provisions:"

and so amended paragraph 4.04.A. remains in effect.

SC-5.01.A.

The first sentence of paragraph 5.01.A. of General Conditions shall be amended to read as follows:

> "CONTRACTOR shall purchase and maintain performance....."

Also, the sixth line of paragraph 5.01.A. of General Conditions shall be amended to read as follows:

> "one year after the date of Official OWNER acceptance, except"

and so amended paragraph 5.01.A. remains in effect.

SC-5.01.B.

The first sentence of paragraph 5.01.B. of the General Conditions shall be amended to read as follows:

"All Bonds shall be in the forms prescribed by Law or Regulations or by the Contract Documents and shall be executed by such sureties as (i) are licensed to conduct business in the state where the Project is located, (ii) are approved by the Louisiana State Insurance Commissioners and (iii) sureties shall have at least an "A" or better financial rating and a Class 8 or better General Policy holder rating according to the latest A.M. Best Company ratings."

and so amended paragraph 5.01.B. remains in effect.

SC-5.04.A.

The insurance requirements in Article 5.04.A. of General Conditions are hereby modified. All liability and property insurance shall be purchased and maintained by CONTRACTOR as set forth herein.

Satisfactory certificates of insurance shall be filed with OWNER/ ENGINEER prior to starting any construction work on this contract. Applicable provisions of General Conditions 5.04.A. shall govern the purchase of all insurance coverage.

"5.04.A.1 & 5.04.A.2. Workmen's Compensation and Employer's Liability:
This insurance shall protect CONTRACTOR against all claims under applicable state workmen's compensation laws. CONTRACTOR shall also be protected against claims for injury, disease, or death of employees, which, for any reason, may not fall within the provisions of a workmen's compensation law. This policy shall include an "all states" endorsement.

The liability limits shall be not less than:

Workmen's compensation	Statutory
Employer's liability	$100,000 each occurrence

5.04.A.3. through 5.04.A.5. Comprehensive General Liability: This insurance shall be written in comprehensive form and shall protect CONTRACTOR against all claims arising from injuries to persons other than his employees or damage to property of OWNER or others arising out of any act or omission of CONTRACTOR or his agents, employees, or Subcontractors. The policy shall also include protection against claims insured by usual personal injury liability coverage, a "protective liability" endorsement to insure the contractual liability assumed by CONTRACTOR under the indemnification provisions in General Conditions, and "Completed Operations and Products Liability" coverage (to remain in force during the correction period). To the extent that CONTRACTOR’s work, or work under his direction, may require blasting, explosive conditions, or underground operations, the comprehensive general liability coverage shall contain no exclusion relative to blasting, explosion, collapse of buildings, or damage to underground property.

Combined single limits of $500,000.00 each occurrence and $1,000,000 aggregate for Bodily Injury and Property Damage.

5.04.A.6. Comprehensive Automobile Liability: This insurance shall be written in comprehensive form and shall protect CONTRACTOR against all claims for injuries to members of the public and damage to property of others arising from the use of motor vehicles licensed for highway use, whether they are owned, non-owned, or hired.

The liability limits shall be not less than:

Combined single limit of $500,000.00 each occurrence and $500,000 aggregate for Bodily Injury and Property Damage.

5.04.A.7. Umbrella Liability Policy: This insurance shall protect CONTRACTOR against all claims in excess of the limits provided under the workmen's compensation and employer's liability, comprehensive automobile liability, and general liability policies. The liability limits of the umbrella liability policy shall not be less than $5,000,000."

and so amended paragraph 5.04.A. remains in effect.

SC-5.04.B.

The contractual liability required by paragraph 5.04.B.2. of General Conditions shall provide coverage for not less than the following amounts:

"5.04.B.2.1.	Bodily Injury:	$500,000	each occurrence
		$1,000,000	aggregate
5.04.B.2.2.	Property Damage	$250,000	each occurrence
		$500,000	aggregate"

Amend the first line of the paragraph following paragraph 5.04.B.6. of General Conditions to read as follows:

"Remain in effect until Official OWNER acceptance and at all times thereafter..."

Amend the third and fourth lines of the paragraph 5.04.B.7. of General Conditions to read as follows:

"...remain in effect for at least two years after Official OWNER acceptance..."

and so amended Article 5.04.B. of General Conditions remains in effect.

SC-5.06.A.

Change the first sentence of paragraph 5.06.A to read as follows:

"5.06.A. CONTRACTOR shall purchase and maintain, from effective date of agreement to official OWNER acceptance, property insurance upon the Work at the site..."

Add paragraph 5.06.A.8 of General Conditions to read as follows:

Installation Floater: This insurance shall protect CONTRACTOR, OWNER and ENGINEER from all insurable risks of physical loss or damage to materials and equipment not otherwise covered under builder's risk insurance, while in approved warehouses or approved storage areas, during installation, during testing, and after the Work is completed. It shall be of the "all-risks" type, with coverage designed for the circumstances which may occur in the particular Work included in this contract. The coverage shall be for an amount not less than the insurable value

of the Work at completion, less the value of the materials and equipment insured under builder's risk insurance. The value shall include the aggregate value of the OWNER-furnished equipment and materials (if any) to be erected or installed by CONTRACTOR not otherwise insured under builder's risk insurance.

Installation floater insurance shall provide for losses to be payable to CONTRACTOR, OWNER and ENGINEER as their interest may appear. The policy shall contain a provision that in the event of payment for any loss under the coverage provided, the insurance company shall have no rights of recovery against the CONTRACTOR, OWNER and ENGINEER.

Certificates of insurance covering installation floater insurance shall quote the insuring agreement and all exclusions as they appear in the policy; or in lieu of certificates, copies of the complete policy may be submitted."

SC-5.06.B.

Delete entire paragraph 5.06.B. of General Conditions.

SC-5.06.D.

Add the following language at the end of paragraph 5.06.D. of General Conditions:

"No property insurance required by Contract Documents shall have deductible amount in excess of $5,000.00."

SC-5.06.E.

Delete entire paragraph 5.06.E. of General Conditions.

and so amended Article 5.06. of General Conditions remains in effect.

SC-6.02.B.

The following paragraph shall be added at the end of paragraph 6.02.B. of General Conditions:

"6.02.B.1. Overtime Work: No work shall be done between 6:00 P.M. and 7:00 A.M. nor on Sundays or legal holidays without permission of OWNER. However, emergency work may be done without prior permission.

Night work may be undertaken as a regular procedure with the permission of OWNER; such permission, however, may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for the proper prosecution and control of the Work at night.

The CONTRACTOR shall establish a normal work schedule which does not exceed 40 hours per week.

and so amended Article 6.02.B. of General Conditions remains in effect.

SC-6.03.A.

Add the following language at the end of paragraph 6.03.A. of General Conditions:

> "Except for items specifically identified as provided by OWNER, CONTRACTOR shall pay for all labor, materials and other costs incurred under this contract."

and so amended paragraph 6.03.A. remains in effect.

SC-6.04.A.1.

At the end of paragraph 6.04.A.1. of General Conditions to read as follows:

> "Contractor shall submit adjustments in the progress schedule every thirty (30) days or as directed by ENGINEER to reflect the impact thereon of new developments."

and so amended paragraph 6.04.A. remains in effect.

SC-6.09.B.

The words "knowing or having reason to know" in the first and second line of paragraph 6.09.B. of the General Conditions shall be substituted with "knowing or should have known."

and so amended paragraph 6.09.B will remain in effect.

SC-7.02.A.

The words "Supplementary Conditions" in the third line of paragraph 7.02.A. of the General Conditions shall be substituted with "Special Provisions."

and so amended paragraph 7.02.A. will remain in effect.

SC-7.02.B.

The words "Supplementary Conditions" in the first line of paragraph 7.02.B. of the General Conditions shall be substituted with "Special Provisions."

and so amended paragraph 7.02.B. will remain in effect.

SC-9.03.

The paragraph 9.03. of General Conditions shall be amended by adding, at the end of the paragraph, the following language:

> "ENGINEER may furnish a Resident Project Representative and assistants to aid ENGINEER in carrying out his responsibilities at the site. The duties, responsibilities and limitations of authority of the Resident Project Representative are set forth in Exhibit A attached to these Supplementary Conditions."

and so amended paragraph 9.03. will remain in effect.

SC-10.05.E.

The words "will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke" in the third line of paragraph 10.05.E. of the General Conditions shall be substituted with "will not be final and binding upon Owner and Contractor, the Owner or Contractor may invoke "

and so amended paragraph 10.05.E will remain in effect.

SC-12.03.F and SC-12.03.G.

Add the following articles 12.03.F and 12.03.G. after paragraph 12.03.E. of General Conditions.

> "12.03.F. CONTRACTOR shall accept the risk of any delays caused by the rate of progress of the Work to be performed under other Sections of this contract or other contracts. In the event CONTRACTOR is delayed in the prosecution and completion of the Work because of such conditions, CONTRACTOR shall have no claim against OWNER for damages or contract adjustment other than an extension of Contract Time and waiving of liquidated damages during the period occasioned by the delay.
>
> 12.03.G. Time limitations required by OWNER shall be for the benefit of OWNER and CONTRACTORs under other Sections of this contract or other contracts who have entered into such contracts with OWNER in reliance on the time limitations set forth in these Contract Documents. Any claim by CONTRACTOR for damages due to delay by another contractor shall be asserted against that CONTRACTOR."

and so amended paragraph 12.03. remains in effect.

SC-14.02.A.1.

Add article 14.02.A.1.a. and 14.02.A.1.b. immediately after paragraph 14.02.A.1. of General Conditions, as follows:

> "14.02.A.1.a. Schedules: Each Application for Progress Payment shall be accompanied by CONTRACTOR's updated schedule of operations, or progress report, with such shop drawing schedules, procurement schedules, value of material on hand included in application, and other data specified in Division 1 or reasonably required by ENGINEER.
>
> 14.02.A.1.b. Payment for Material on Hand:
>
> (a) General: When approved by the ENGINEER, advance payments may be made for fabricated or manufactured materials that are to be incorporated in the project when such materials are stockpiled or stored on the project or in acceptable facilities outside the limits of the project within a 50 mile radius. These materials must meet the specifications; however, partial payment for materials on hand will not constitute acceptance. It shall be the CONTRACTOR's responsibility to protect the material from damage while in storage. Payments shall be limited to those materials described herein that are durable in nature and must represent a SIGNIFICANT portion of the project cost. Further, on lump sum contracts or lump sum bid items, payments shall be limited

to those materials which are specifically identified by a separate line item on the schedule of values. Perishable articles, small warehouse items, reinforcing steel and natural materials such as aggregate, stone, expanded clay, river sand, crushed rock and recycled concrete will not be included.

Payment for materials, unless otherwise stated in the specifications, shall be the invoice price for the material. For fabricated materials purchased from commercial sources and delivered to approved storage, payment for material on hand may be the invoice price plus freight and taxes. The quantity of materials for payment will not exceed the total estimated quantity required to complete the project and the invoice values will not exceed the appropriate portion of the contract item in which such materials are to be incorporated.

The amounts advanced on stockpiles or stored materials will be recovered by the OWNER through deductions made on construction estimates and payments as the materials are incorporated in the work.

Payment for material on hand must be requested by the CONTRACTOR in writing and the following documents must be furnished before approval is recommended:

(1) Written consent from the CONTRACTOR's surety for the OWNER to make such partial payment.

(2) A copy of the original invoices from the supplier or manufacturer verifying the cost and quantity of material, and identifying the material by serial number or other appropriate description.

(3) If storage is on private property, a copy of the lease or agreement granting the OWNER right of entry to the property.

Within thirty (30) days after payment by the OWNER, the CONTRACTOR shall submit a copy of certified invoice statement for each item for which payment has been made. If this certification of payment is not presented within the thirty (30) day period, the advance payment will be deducted from future progress payments.

Title and ownership of materials for which advancements have been made by the OWNER shall not vest in the OWNER until such materials are actually incorporated in the work and the work accepted by the OWNER and the making of advancements thereof by the OWNER shall not release the CONTRACTOR from the responsibility for any portion thereof.

(b) Fabricated Material: This shall be fabricated or manufactured materials that are purchased by the CONTRACTOR for the project and may include but is not limited to the following:

Structural steel, fabricated structural steel items, steel piling, mechanical equipment, electrical equipment, precast and precast-prestressed concrete items including pipe, fittings, piling, girders and bridge sections, structural timber, timber piling, metal and PVC pipe and fittings."

and so amended paragraph 14.02.A.1. remains in effect.

SC-14.02.C

The beginning of the first sentence of paragraph 14.02.C.1. of General Conditions shall read as follows:

"Thirty days after presentation ....."

and so paragraph 14.02.C. as amended above remains in effect.

SC-14.07.A.

Add the following language after paragraph 14.07.A.3. of General Conditions:

"4. CONTRACTOR's Application for Final Payment shall also be accompanied by consent of the Surety to final payment and a clear lien and privilege certificate issued by the Clerk of Court and Ex-Officio Recorder of Mortgages for the Parish."

and so paragraph 14.07.A. as amended above remains in effect.

SC-14.07.C.

The first sentence of paragraph 14.07.C.1. of General Conditions shall be amended as follows:

Delete words "Thirty days" from beginning of first sentence of the paragraph 14.07.C.1. and insert "and in accordance with Louisiana State Public Contract Statute" before the words "will become due" in the fourth line of this paragraph.

and so paragraph 14.07.C. as amended above remains in effect.

SC-14.08.

Add the following language at the end of paragraph 14.08. of General Conditions:

"When CONTRACTOR is in default for nonperformance within the stipulated Contract Time, OWNER shall deduct the liquidated damages amount stated in the Agreement from the CONTRACTOR's payment request."

and so paragraph 14.08. as amended above remains in effect.

SC-16.01.C.

Delete entire paragraph 16.01.C. of General Conditions. Add the following new paragraph 16.01.C at the end of paragraph 16.01 of General Conditions:

C. If the Claim is not resolved by mediation, , the Owner or Contractor must within 30 days after termination of the mediation:

1. agree with the other party to submit the Claim to another dispute resolution process, or

2. give written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction. For this contract the court of competent jurisdiction shall be the Louisiana 23rd Judicial District Court.

and so amended Article 16.01. of General Conditions remains in effect.

SC-17.07.

Add the following new paragraph at the end of paragraph 17.06. of General Conditions:

"17.07. Assignment: Neither party to this contract shall assign or sublet his interest in this contract without written consent of the other, nor shall CONTRACTOR assign any moneys due or to become due him under this contract without previous written consent of OWNER, nor without the consent of the surety unless the Surety has waived its right to notice of assignment."

and so paragraph 17. as amended above remains in effect.

END OF SECTION

EXHIBIT A

Duties, Responsibilities and Limitations of Authority
of Resident Project Representative

A. General

Resident Project Representative (RPR) is ENGINEER's agent at the site, will act as directed by and under the supervision of ENGINEER, and will confer with ENGINEER regarding RPR's actions. RPR's dealings in matters pertaining to the on-site work shall in general be with ENGINEER and Contractor, keeping OWNER advised as necessary. RPR's dealings with subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with OWNER with the knowledge of and under the direction of ENGINEER.

B. Duties and Responsibilities of RPR

1. *Schedules:* Review the progress schedule, schedule of Shop Drawing submittals and schedule of values prepared by Contractor and consult with ENGINEER concerning acceptability.

2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.

3. *Liaison:*

    a. Serve as ENGINEER's liaison with Contractor, working principally through Contractor's superintendent and assist in understanding the intent of Contract Documents.

    b. Assist ENGINEER in serving as OWNER's liaison with Contractor when Contractor's operations affect OWNER's on-site operations.

    c. Assist in obtaining from OWNER additional details or information, when required for proper execution of the Work.

4. *Interpretation of Contract Documents*: Report to ENGINEER when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by the ENGINEER.

5. *Shop Drawings and Samples:*

    a. Record date of receipt of Shop Drawings and Samples.

    b. Receive Samples which are furnished at the site by Contractor, and notify ENGINEER of availability of Samples for examination.

c. Advise ENGINEER and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which the RPR believes that the submittal has not been approved by ENGINEER.

6. *Modifications*: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report with RPR's recommendations to ENGINEER. Transmit to Contractor in writing decisions as issued by ENGINEER.

7. *Review of Work, Rejection of Defective Work:*

   a. Conduct on-site observations of the Work in progress to assist ENGINEER in determining if the Work is in general proceeding in accordance with the Contract Documents.

   b. Report to ENGINEER whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise ENGINEER of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. *Inspections, Tests and System Start-ups:*

   a. Consult with ENGINEER in advance of scheduled major inspections, tests, and systems start-ups of important phases of the Work.

   b. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate OWNER's personnel, and that Contractor maintains adequate records thereof.

   c. Observe, record, and report to ENGINEER appropriate details relative to the test procedures and systems start-ups.

   d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections, and report to ENGINEER.

9. *Records:*

   a. Maintain at the job site orderly files for correspondence, reports of job conferences, Shop Drawings and Samples, reproductions of original Contract Documents including all Change Orders, Field Orders, Work Change Directives, Addenda, additional Drawings issued subsequent to the execution of the Contract, ENGINEER's clarifications and interpretations of the Contract Documents, progress reports, Shop Drawing and Sample submittals received from and delivered to Contractor and other Project related documents.

   b. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the job site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, daily activities, decisions,

observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to ENGINEER.

c. Record names, addresses and telephone numbers of all Contractors, subcontractors and major suppliers of materials and equipment.

d. Maintain records for use in preparing Project documentation.

e. Upon completion of the Work, furnish original set of all RPR Project documentation to ENGINEER.

10. *Reports:*

a. Furnish to ENGINEER periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.

b. Draft and recommend to ENGINEER proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

c. Furnish to ENGINEER and OWNER copies of all inspection, test, and start-up reports.

d. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Constituent of Concern. .

11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to ENGINEER, noting particularly the relationship of the payment requested to the schedule of values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.

12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to ENGINEER for review and forwarding to OWNER prior to payment for that part of the Work.

13. *Completion:*

a. Before ENGINEER issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.

b. Observe whether Contractor has arranged for inspections required by Laws and Regulations, including but not limited to those to be performed by public agencies having jurisdiction over the work.

c. Participate in a final inspection in the company of ENGINEER, OWNER and Contractor and prepare a final list of items to be completed or corrected.

d. Observe whether all items on final list have been completed or corrected and make recommendations to ENGINEER concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. Resident Project Representative shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items), unless authorized by ENGINEER.

2. Exceed limitations of ENGINEER's authority as set forth in the Agreement or the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.

4. Advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction unless such advice or directions are specifically required by the Contract Documents.

5. Advise on, issue directions regarding or assume control over safety precautions and programs in connection with the activities or operations of OWNER or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by ENGINEER.

7. Accept Shop Drawings or Sample submittals from anyone other than Contractor.

8. Authorize OWNER to occupy the Project in whole or in part.

END OF SECTION

SECTION 00 74 00

SPECIAL PROVISIONS

SP-1 CONFLICTS. Where conflicts exist between the General Specifications and these Special Provisions; the provisions of these Special Provisions shall govern. Where conflicts exist within the Drawings & Specifications themselves, the more stringent Specification shall apply.

SP-2 VISIT TO SITE. The bidder shall visit the site of the proposed work in order that he may understand the facilities, difficulties and restrictions attending the execution of the contract. He will be allowed no additional compensation for failure to be so informed.

SP-3 SOIL BORINGS. So borings have been performed on this project and may be reviewed, upon request, at the office of the Design Engineer.

SP-4 INTENT OF DOCUMENTS. It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, supplies, light, power, transportation, superintendent, temporary construction of every nature, and all other services and facilities of every nature whatsoever, necessary to execute, complete and deliver within the specified time.

SP-5 AWARD OF CONTRACT. The contract shall be awarded based on the lowest responsive and responsible bidder for the total bid price of either the base bid or the alternate bid as determined by the Owner and in conformance with the Contract Specifications.

SP-6 INFORMALITIES. The Owner has the right to reject all proposals and may exercise the right if doing so may appear to be in the best interest of the Owner. The Owner may waive informalities in the lowest proposal and accept this proposal if doing so may appear to be in the best interest of the Owner.

SP-7 LOCAL FIRMS. By statutory authority, preference is hereby given to resident contractors doing business in the State of Louisiana (LSA R.S. - 38:2253). Nonresident contractors shall be awarded contracts only on the same basis as the nonresident contractor's state awards contracts to Louisiana contractors bidding under similar circumstances.

SP-8 LOCAL LABOR PREFERENCE. To the extent that qualified mechanics and laborers are available, employment preference shall be given to bona-fide residents of the parish in which the project exists.

SP-9 RECORDING OF CONTRACT. Within ten (10) days after the signing of the contract, the Contractor shall record the contract with the Clerk of Court in the parish of construction and send one (1) copy of the recorded contract to Burk-Kleinpeter, Inc. and two (2) copies to the Owner.

SP-10 INSURANCE CERTIFICATES. The Contractor shall deliver the required insurance certificate for the project to the Engineer within ten (10) days of the execution of the

Agreement. Failure to comply with this requirement will delay issuance of the Full Notice to Proceed.

SP-11 PERFORMANCE AND PAYMENT BONDS. All payment and performance bonds provided in connection with any contract let by or on behalf of the Parish shall be provided by a company or companies having at least an "A" or better financial rating according to the latest A.M. Best Company ratings and shall be in an amount at least equal to the Contract Price.

SP-12 SALES TAXES. Parish and state sales taxes shall be paid by the Contractor. The Owner shall be relieved of any obligations to pay these taxes.

SP-13 NOTICE TO PROCEED. Sometime after the Contract has been signed, the Engineer will issue the Owner's Notice to Proceed directing the Contractor to start work within ten (10) days after the date of the Notice to Proceed. The Notice to Proceed will not be issued prior to submittal and approval of the Contractor's Construction Progress Schedule. The contract time shall commence with the issuance of the Notice to Proceed.

SP-14 NOTICE TO SURETY. It is the Contractor's responsibility to notify his surety of any changes affecting the general scope of the work or changes in the contract price and the amount of the applicable bonds shall be adjusted accordingly. The Contractor shall furnish proof of such adjustment to the Engineer and Contracting Agency.

SP-15 PAYMENTS TO CONTRACTOR. The Owner agrees to make payment to its Contractor promptly sums due under this contract and to retain only such amounts as may be justified by specific circumstances specifically provided for in the construction contract to the following schedule:

a. Retention up to ten percent (10%) of payments for projects with contract prices of less than $500,000.00.

b. Retention of five percent (5%) of payments for projects with contract prices of $500,000.00 or more.

Wherever an item of work to be performed under this contract is specified in any of the bid documents as being paid at an item total price, the Contractor shall be paid the entire amount that appears in his bid proposal for that item.

Wherever the estimated quantities (i.e., cubic yards of sand, shell, etc.) of materials to be furnished under this contract are shown in any of the documents, including the Proposal, they are given for use in comparing bids and are not to be construed as exact quantities. The Owner reserves the right to increase or diminish these quantities as may be necessary to complete the work contemplated by this contract. The Contractor shall be paid for the actual quantity of items or material used, and payment will be at the respective unit price bid for these items or materials.

The sum of the products of approximate quantities multiplied by the unit price bid, constitute the total base bid price or total alternate bid price which sums shall be used in comparison of bids, and the awarding of the Contract.

It shall be understood that the total base bid or alternate bid price figure, wherever specified in the bid document, may not reflect the actual amount the Contractor will receive upon completion of the work. This figure shall be adjusted in accordance with the actual quantity of unit price items used.

All payment requests or invoices must be sent first to the engineers/architects for review and comment on the proper Parish forms, which are then forwarded to the appropriate Parish user department. Contractors who fail to follow this procedure will not be paid on a timely basis due to the unnecessary delays in re-routing the payment requests.

SP-16 COMPLETION. The Contract shall be completed in every respect, including the repair of all damages to property resulting from the work of this contract, within three hundred sixty five (365) calendar days from the start date indicated on of the Owner's Notice to Proceed or the Engineer acting on behalf of the Owner.

SP-17 LIQUIDATED DAMAGES. Time is an essential condition of the contract. Should the Contractor fail to perform the work within the contract time stipulated herein, the Contractor shall pay to the Owner, as liquidated damages and not as a penalty, the sum of Five Hundred Dollars ($500.00) per day for each calendar day beyond the completion time specified, unless the contract time is extended by the Owner.

The stated time of completion includes an assumed percentage of inclement weather days. No consideration shall be given to a request for a contract time extension due to inclement weather, except for extraordinary conditions such as hurricanes, floods, and the like. Refer to Special Provision SP-19.

The Owner shall retain the amount of such damages from any money due or to become due the Contractor under this contract without the necessity of the Owner putting the Contractor or his Surety either or both in default, in accordance with paragraph SC-14.08 of the Supplementary Conditions.

SP-18 UNFAVORABLE CONSTRUCTION CONDITIONS. Contractor shall confine his operations to work which will not be affected adversely by unfavorable weather, wet ground, or other unsuitable construction conditions. No portion of the work shall proceed under conditions which would affect adversely the quality or efficiency of the work, unless suitable special precautions or countermeasures are taken by Contractor. These special precautions or countermeasures must be approved by the Engineer.

SP-19 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER: This provision specifies the procedure for determination of contract time extensions for unusually severe weather in accordance with the contract clause in the General Conditions, Paragraph 12.02. In order for the Engineer to recommend and the Owner approve a time extension under this clause, the following conditions must be satisfied.

1. The weather experienced at the project site during the contract period must be found to be unusually severe. That is, more severe than the adverse weather anticipated for the project location during any given month.

2. The unusually severe weather must actually cause a delay to the complete of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) New Orleans (Airport) Weather Station located near the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER CALENDAR DELAY WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(11)	(9)	(5)	(4)	(4)	(6)	(9)	(9)	(6)	(4)	(5)	(9)

Upon acknowledgment of the Full Notice to Proceed and continuing throughout the contract, the Engineer/Owner will record on the daily report the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day.

The number of actual adverse weather delays shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in the table above, the contract time will be modified reflecting any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled "Change in the Contract Time, Article 12 of the General Conditions.

SP-20 MAINTENANCE OBLIGATION. If at any time during the performance of this contract or for a period of twelve (12) months after final acceptance of the project, defects in construction and/or workmanship should develop, the contractor shall promptly repair and/or replace the defect even though such workmanship and/or material has already passed inspection. All such repair work is an obligation of the Contractor and the cost thereof must be included in the prices bid for the various items of work.

SP-21 APPLICABLE CODES. References in the Contract Documents to local codes mean all codes enforceable in unincorporated Ascension Parish and the State of Louisiana.

SP-22 SAFETY AND HEALTH REGULATIONS. All work and construction practices shall conform to "Federal Register - Volume 36 - Number 105 - Part II - Department of Labor - Bureau of Standards - Safety and Health Regulations for Construction", or the latest revision thereof.

SP-23 INSPECTION BY PUBLIC AGENCIES. Authorized representatives of any applicable permitting or regulatory agency shall have access to the work wherever it is in preparation or progress. Contractor shall provide proper facilities for such access and inspection.

SP-24 UTILITY RELOCATION. The Contractor shall notify the owning water and/or sewer authority prior to commencing any work involving removal, valving-off, or relocation of water or sewer lines. The Contractor shall also notify the gas companies, the power company, cable TV company and the telephone company to coordinate relocation and construction operations.

SP-25 PROTECTION OF PROPERTY AND STRUCTURES. The Contractor shall, at his own expense, sustain in their places and protect from direct or indirect injury all pipes, poles, fencing, walls, and other structures or property in the vicinity of his work whether above or below the ground, or that may appear in the trench. He shall at all times have a sufficient quantity of timber and planks, chains, ropes, etc., on the ground and shall use them as necessary for sheathing his excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened, or weakened. The Contractor shall assume all risks attending the presence or proximity of piles, poles, fencing, walls, buildings, and other structures and property of every kind and description in or over his trenches or in the vicinity of his work, whether above or below the surface of the ground, that are indicated on the Contract Drawings or may be discovered on the site by the use of reasonable investigation and caution; and he shall be responsible for all damage and assume all expense for direct or indirect injury caused by his work to any of them, or to any person or property by reason of injury to them. Contractor shall indemnify and hold harmless Owner and Engineer and their agents and employees from and against all claims, damages, losses and expenses including, but not limited to attorney's fees, arising out of or resulting from the performance of the work, when such claim, damage, loss, or expense is caused by work of the Contractor, any sub-contractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused by a party indemnified hereunder.

SP-26 PROTECTION OF TREES, PLANTS, AND SHRUBBERY. The Contractor shall be responsible for protecting all trees, plants, and ornamental shrubbery on the line of or adjacent to the proposed construction, whether these trees, plants, and shrubbery are within the servitude or not.

As indicated on the Drawings, or as directed by the Engineer, the Contractor may permanently remove, or remove and transplant trees or shrubbery to facilitate his construction operation. Plants to be relocated shall be properly balled and protected to prevent damage. All transplanting shall be under the supervision of a qualified landscape gardener. After construction, all shrubbery designated to be transplanted, shall be replaced in their original location in good condition. The cost for this item shall be included in the unit price bid for other items.

Contractor, after visiting the site, shall be aware of existing trees and shall not be allowed to cut or destroy any trees on private property or tree limbs overhanging project limits from private property without first obtaining written permission from the property owners. Trees within the servitude may be cut or destroyed only with the approval of the Engineer.

SP-27 PROTECTION OF INSTALLED CULVERTS. Contractor is responsible for any and all materials required for protecting drainage culverts installed under this project as deemed necessary by his construction techniques. No additional compensation shall be made for timber matting or other additional construction materials. All costs shall be included in unit prices of related work.

SP-28 UNDERGROUND INSTALLATIONS. Existing underground installations are indicated on the Contract Drawings only to the extent that such information was made available to or discovered by the Engineer in preparing the Contract Drawings. There is no guarantee as to the accuracy or completeness of such information, and all responsibility for the accuracy and completeness thereof is expressly disclaimed. If Contractor fails to discover an underground installation and damages same, he shall be responsible for the cost of the repair. Generally, service connections are not indicated on the drawings. Contractor shall be responsible for discovery of existing underground installations, in advance of excavating or trenching, by contacting all local utilities, and by prospecting.

SP-29 HISTORICAL OR ARCHAEOLOGICAL DEPOSITS. If, during the course of construction, evidence of deposits of historical or archaeological interest is found, Contractor shall cease operations affecting the find and shall notify the Owner, who shall notify the Regional Office of the Environmental Protection Agency and the State Historical Preservation Officer. No further disturbance of the deposits shall ensue until Contractor has been notified by the Owner that he may proceed. Owner shall issue a notice to proceed only after the state official has surveyed the find and made a determination to the Environmental Protection Agency and Owner. Compensation to the Contractor, if any, for lost time or for changes in construction to avoid the find, shall be determined in accordance with changed conditions or change order provisions of the Contract Documents. (Reference: 80 Stat 915, 16 USC 470 and Executive Order No. 11593 of May 31, 1971.)

END OF SECTION

SECTION 01 10 99

MISCELLANEOUS REQUIREMENTS

1.0 GENERAL

1.01 DIVISIONS AND SECTIONS

A. Separation of these specifications into Divisions and Sections is done for convenience only and is not intended to establish responsibilities of work, nor shall it operate to make the Owner's Representative arbiter to establish limits to the Contracts between Contractor and Subcontractors.

B. Bidding and Contract Requirements

1. The Contractor, by execution of the subject documents agrees to comply with all applicable contract conditions.

1.02 NOT IN CONTRACT

A. Items indicated on drawings as "NIC", or noted "Not in Contract", are shown for convenience only and are not a part of this Contract.

1.03 ACCEPTANCE

A. Signing of the Contract will be deemed evidence that site and documents have been examined and that the Contractor is familiar with conditions under which the work will be done.

B. The Contractor shall verify measurements at site and accept responsibility for accuracy of same. The beginning of work indicates acceptance of conditions under which the work will be done.

C. Extra payments will not be authorized for work that could have been determined by a careful examination of site conditions and coordination with the Contract Documents.

1.04 FACILITATING OVERHEAD UTILITIES

A. The Contractor shall examine the site in detail in conformance with other requirements of these specifications. All overhead utilities are not shown on the drawings but are to be noted by the Contractor prior to submission of a bid. Contractor accepts responsibility for execution of the contract duties by submission of his bid.

B. The responsibility of the Contractor includes facilitating overhead lines throughout the completion of the project and assuming all costs for coordinating, de-energizing, re-energizing, temporarily relocating, permanently relocating, or using special construction methods to complete the work as indicated.

1.05 INTERFERENCES

A. Drawings are generally diagrammatic. Contractor shall organize or coordinate his work with that of the different trades so that interferences of different equipment, piping, etc., shall be avoided and each piece of equipment, piping, etc., installed to function properly.

B. In the case where an interference develops, the Engineer is to be consulted to determine which equipment, piping, etc., is to be relocated regardless of which item was first installed.

1.06 PERMITS

A. The Contractor shall obtain and pay for all required permits and inspection certificates.

B. The Contractor shall be responsible for obtaining all permits necessary for the construction of the project including but not limited to EPA NPDES Permits, U.S. Army Corps of Engineers Permits, LDOTD Driveway Permits, LADEQ Permits, Ascension Parish Building Permits, etc. The contractor shall pay all fees associated with obtaining any permits.

C. Before commencing any work on the job-site, the Contractor shall obtain a general building permit and all permits, licenses and inspections required for all various trades.

D. The Contractor shall include verification of a building permit to the Owner's Representative with the first partial payment request.

E. Owner will obtain approval of the State Fire Marshal if required. Contractor shall cooperate during any Fire Marshal Inspection.

1.07 NOTICE TO PROCEED

A. After notification from the Owner that the Contractor has signed the construction contract and submitted all necessary bonds, etc., the Owner's Representative shall send the Contractor a written "Notice to Proceed". The Engineer will issue the Owner's Notice to Proceed directing the Contractor to start work within ten (10) days after the date of the Notice to Proceed. The Full Notice to Proceed will not be issued prior to submittal and approval of the Contractor's Construction Progress Schedule. The contract time shall commence with the issuance of the Full Notice to Proceed. The Full Notice to Proceed shall include the following information.:

1. Number of calendar days in the construction contract.

2. Date of the beginning and end of the contract time.

3. Liquidated damages.

4. A statement indicating the Owner's intention to collect liquidated damages if the Contractor exceeds the contract time and any approved extensions.

1.08 JOBSITE MAINTENANCE

A. Keep areas within and about working and storing spaces free from trash, debris, garbage, etc.

B. Throughout the construction period, dirt and dust accumulated in the working, storing and access roadway areas shall be kept to a minimum.

1.09 PERSONNEL AND EQUIPMENT

A. Maintain a construction force at site, including competent, qualified superintendent, mechanics, craftsmen and laborers, sufficient to expedite work to completion on date indicated in Contract Documents.

B. Maintain construction equipment at site, in good condition, sufficient for efficient execution of work.

C. A responsible member of Contractor's organization shall be kept on site while work is in progress as herein specified. All communications given to the Superintendent, or his assistant in his absence, shall be as binding as if given to the Contractor.

1.10 LOCATION

A. Datum shall be assumed as shown on the Contract Documents. Use established bench marks on the site.

B. The Contractor shall lay out all pavement, curbs, new construction and floor elevation from the Contract Documents, and he shall furnish and put in all stakes and batter boards as may be deemed necessary. Contractor shall be solely responsible for all grades, lines and levels.

1.11 OBSTRUCTION TO CONSTRUCTION

A. The Contractor shall anticipate and remove all subsurface as well as above surface obstructions to construction of his work, unless information on subsurface obstructions is not available.

B. General Contractor shall not commence foundation work in areas where existing underground utilities interfere with new construction, until the locations and extent of all existing underground utilities are established and removed, rerouted or abandoned.

1. Contractor shall refer to mechanical and electrical drawings for sequence of work and coordinate his work with his subcontractors.

2. Contractor shall notify the utility companies and/or the Using Agency to remove, re-route or abandon lines which are in or near the line of excavation.

3. Contractor shall notify the Respective Owner well in advance of any work in order to coordinate "tie-ins" and disruption of any services.

1.12 DEMANDS AND CAUSES OF ACTION

A. Contractor shall defend, indemnify, and hold harmless Owner and Engineer and their agents, employees, related and companion corporations (collectively referred to as Owner and Engineer) from and against any and all claims, demands, and personal injury, wrongful death, or property damage, in any way arising out of or resulting from, directly or indirectly, errors, omissions, or negligence related to the work performed by the Contractor or any of his subcontractors, suppliers, agents, or any party under the contract, including all damages, losses, expenses, attorneys' fees and costs.

B. These defense and indemnification obligations are due regardless of whether or not the claims, demands, or causes of action result from the Owner's and/or Engineer's sole, joint, concurrent, or partial negligence, strict liability, fault, or breach of any contract, statute, or law. The parties to this contract also agree that the indemnitor(s) shall reimburse the indemnitee(s) for any and all attorneys' fees, costs, and other expenses associated with the enforcement of this or any other provision in the contract.

1.13 EXISTING UNDERGROUND UTILITIES

A. The Contractor shall verify the location of all existing off site underground utilities which he is to relocate or to which he is to connect his work.

B. Interruption of Services

1. It is essential that all utilities be kept in operation at all times, except when specific written permission of the Owner is given to the contrary. Before any lines are shutdown for tie-ins or rearranging of services, arrangements shall be made a minimum of 48 hours in advance with the Owner. It may be necessary to do this work at night, on Sunday or at a special time of the year, as the Owner may direct, with the length of shutdown agreed upon before work is begun. Any overtime work costs in this connection shall be borne by the Contractor. Normally, only one shutdown will be allowed. The length of shutdown shall be held to a minimum.

C. Protection of Existing Underground Utilities

1. The contractor is responsible for thorough protection of existing underground utilities within the limits of work. Where utilities are to be encountered, only hand digging shall be allowed. Any damage must be immediately repaired to restore service to the Owner including work at night and weekends.

1.14 WATCHMAN

A. Services of a watchman are not required, but the Contractor shall be fully responsible for and shall provide reasonable protection to prevent damage to all the work and all materials and equipment to be incorporated therein.

1.15 SUPERINTENDENCE

A. The Contractor shall employ a competent Superintendent and necessary assistants who shall be in attendance at the project site during the progress of the Work. The Owner's

Representative shall be advised of the Superintendent to be employed and he shall not be changed, except with the consent of the Engineer, unless Superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The Superintendent shall represent the Contractor and all communications given to the Superintendent shall be as binding as if given to the Contractor. Important communications will be confirmed in writing. Other communications will be so confirmed on written request in each case.

1.16 SERVICE CHARGES

A. Include all service charges that may be applicable for execution and completion of the Work.

B. Temporary service charges shall be determined by Contractor's arrangements with respective Utility Companies.

1.17 SALVAGE AND DISPOSITION OF MATERIAL AND EQUIPMENT

A. The Owner shall have priority for the selection of salvaged equipment and materials. Any equipment and materials selected to remain the property of the Owner shall be removed and delivered to a location as designated by the Owner on the Site. Material not retained by the Owner shall become the property of the Contractor and shall be removed from the site by him at no direct cost to the Owner.

1.18 RESIDENT PROJECT REPRESENTATIVE

A. The Engineer may furnish a Resident Project Representative and assistants to aid Engineer in carrying out his responsibilities at the site. The duties, responsibilities, and limitations of authority of the Resident Project Representative are set forth in Section 00 73 00 included in these documents.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 10 00

SUMMARY OF WORK

1.0 GENERAL

1.01 APPLICATION

A. The General Contractor and all Subcontractors shall familiarize themselves with the Bidding Requirements and Division 1 - General Requirements, and shall comply with all parts of these documents pertinent to their work.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Contract work includes all plant, labor, materials and equipment necessary to complete all work shown on the Drawings and herein specified.

B. The proposed work, provides for the purchase, delivery, installation and start-up of the following.

1. One (1) automated rake screen cleaner as described in detail in Section 11 82 35.

2. One (1) 1,076 cfs vertical pump, axial-flow and mixed-flow impeller type as described in detail in Section 22 10 00.

3. Model testing for the selected pump as described in detail in Section 22 10 01.

4. One (1) horizontal offset parallel speed reducing gear as described in detail in Section 33 45 00.

5. One (1) right angle gear drive speed reducer as described in detail in Section 33 45 00.

6. One (1) diesel fueled engine pump drive as described in detail in Section 41 65 10.

7. Five (5) sets of engineered grid coolers for the diesel engine described in detail in Section 41 65 10 and the speed reducers described in detail in Section 33 45 00.

8. Delivery of all equipment to the Marvin Braud Drainage Pump Station for storage prior to installation.

9. Coordinating with the Installation Contractor to insure proper installation of all equipment within the Contract as detailed in the specifications.

10. Performing start-up and testing of all equipment within the Contract and training for Owners personnel as detailed in the specifications.

C. The proposed work shall include all necessary civil, architectural, structural, mechanical, and electrical work as indicated in these specification and as shown on the drawings necessary to facility the installation of the equipment listed above and for proper operation of the pump station at the completion of the project.

D. Contractor's duties:

1. Except as specifically noted, provide and pay for:

   a. Labor, materials and equipment.

   b. Tools, construction equipment and machinery.

   c. Temporary facilities required for construction.

   d. Other facilities and services necessary for proper execution and completion of work.

   e. Insurance as required by the Contract Documents.

2. Pay legally required sales, consumer and use taxes.

3. Secure and pay for, as necessary for proper execution and completion of work, and as specified at time of receipt of bids:

   a. Permits

   b. Government fees

   c. License

4. Give required notices.

5. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.

6. Promptly submit written notice to the Engineer of observed variances of contract documents from legal requirements.

7. Enforce strict discipline and good order among employees.

8. Verify measurements at site and accept responsibility for accuracy of same.

9. Remove obstructions as necessary for proper completion of work.

1.03 ITEMS BY OWNER

A. Testing Laboratory Services

1.04 CONTRACT

A. Construct the work under single unit price contract.

1.05 OWNER FURNISHED DOCUMENTS

A. The Contractor will be furnished, free of charge, four (4) copies of Drawings and four (4) copies of Specifications. Additional copies may be furnished at the cost of reproduction. Contractor may not reproduce (or have reproduced) contract drawings without specific written permission of the Engineer.

1.06 CONTRACTOR'S USE OF PREMISES

A. Confine operations at site to areas permitted by:

1. Law

2. Ordinances

3. Permits

4. Contract Documents

B. Do not unreasonably encumber site with materials or equipment.

C. Do not load slabs, walks or drive surfaces with weight that may endanger structures.

D. Assume full responsibility for the protection and safekeeping of products stored on premises.

E. Do not interfere with the operation or use of any existing structures on the site.

F. Workmen will not be allowed to use facilities in adjacent buildings.

G. Coordinate any interruption in utility service and obtain permission from Owner prior to interruption, see Section 01 10 99 - Miscellaneous Requirements.

H. Protect existing underground utilities adjacent to structures. Use caution in excavating, pile driving and use of equipment, see Section 01 10 99 - Miscellaneous Requirements.

I. Coordinate all traffic control with the Owner.

J. Owner will occupy the site and the existing building during the construction period, and the Owner shall be notified no less that 72 hours in advance of any activities which may affect the Owner’s operations.

K. <u>Contractor shall require that no more than one drainage pump be removed from service at one time.</u>

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

SECTION 01 14 16

COORDINATION

1.0 GENERAL

1.01 DESCRIPTION OF RESPONSIBILITIES

A. The Contractor shall coordinate scheduling, submittals and work of the various sections of the Specification to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.

B. Each Contractor and subcontractor involved shall assume all liability, financial or otherwise, in connection with his work and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delay or loss experienced by him because of the presence and operations of any other Contractors working within the limits of this project.

C. The Contractor shall arrange his work and shall place and dispose of the materials being used so as not to interfere with operations of others working in the surrounding area. He shall join his work with that of others in an acceptable manner and shall perform it in proper sequence to that of the others.

D. The contracting agency will not be responsible for any delays or inconvenience to the Contractor in carrying on his work while any public utility companies or agencies are making necessary adjustments of their fixtures or appurtenances, nor will the contracting agency be responsible for any cost incurred by the Contractor or utility owners for making said adjustments, by delays, etc.

1.02 EASEMENTS AND RIGHT-OF-WAY (SERVITUDE)

A. The easements and rights-of-way for the work will be provided by the Owner, Contractor shall confine his construction operations within the limits indicated on the drawings, and shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies, so as to cause the least possible damage to property and interference with traffic.

B. Servitudes across private property, if they exist, are indicated on the Drawings. Contractor shall set stakes to mark the boundaries of construction servitudes across private property. The stakes shall be protected and maintained until completion of construction and cleanup.

C. Certain permits shall be obtained by Owner. All Work performed and all operations of Contractor, his employees or Subcontractors, within the limits of rights-of-way, shall be in conformity with the requirements and be under the control (through Owner) of the authority owning, or having jurisdiction over and control of, the right-of-way.

1.03 NOTICES TO OWNERS AND AUTHORITIES

A. Contractor shall, as provided in General Conditions, notify owners of adjacent property and utilities when prosecution of the Work may affect them.

B. When it is absolutely necessary to temporarily deny access by owners or tenants to their property, or when any utility service connection must be interrupted, Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instruction on how to limit their inconvenience.

C. Utilities and other concerned agencies shall be contracted at least 24 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

1.04 CONNECTIONS TO EXISTING FACILITIES

A. Unless otherwise specified or indicated, Contractor shall make all necessary connections to existing facilities including structures, drain lines, and utilities such as water, and electric. In each case, Contractor shall receive permission from Owner or the owning utility prior to undertaking connections. Contractor shall protect facilities against deleterious substances and damage.

B. Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

C. Materials shall be cut and removed to the extent indicated on the Plans or as required to complete the Work. Materials shall be removed in a careful manner with no damage to adjacent facilities or materials. Materials which are not salvageable shall be removed from the site by Contractor.

D. All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to Engineer, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

SECTION 012200

UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes**,** overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Slope Protection

1. Riprap will not be measured. Cost of riprap shall be included in the lump sum price for slope protection.

2. Geotextile fabric for riprap will not be measured. Cost of the same shall be included in the lump sum price for slope protection.

3. Silt fence ditch checks will not be measured for payment. Cost of the same shall be included in the lump sum cost of slope protection.

4. Silt fences outside of ditches will not be measured for payment. Cost of the same shall be included in lump sum price for slope protection.

5. The payment item for slope protection shall be Number 1.

B. Mobilization

1. Measurement of payment for Mobilization and Demobilization will be on a lump sum basis for all necessary mobilization and demobilization as specified herein.

2. Payment for Mobilization and Demobilization shall cover all preparatory work and operating preparation including the obtaining of all permits, insurance and bonds; movement of personnel, equipment, supplies and incidentals to the project site; the establishment and ultimate removal of temporary offices and other construction facilities necessary for work on this project; all as required for the proper performance and completion of the work.

3. The payment item for Mobilization and Demobilization shall be Number 2.

C. Sheet Pile Wall Removal

1. Measurement of payment for the removal of Steel Sheet Pile Wall will on a lump sum basis for all material, labor, equipment and other necessities to completely remove the sheet pile wall at the entrance to Pump Bay No. 7.

2. Payment of the lump sum bid price for the removal of sheet pile previously installed will be full compensation for all labor, material, equipment and all other necessary items to complete the removal of the all sheet pile wall as described and shown on the drawings.

3. The payment item for the Sheet Pile Wall Removal shall be Number 3.

D. Roof Removal and Replacement Over Pump Bay No. 7

1. The measurement for payment for Roof Removal and Replacement Over Pump Bay No. 7 will be on a lump sum basis. Items include removal of existing roof panels and insulations to the dimensions shown on the drawings, removal and replacement of the existing purlins, and installation of new metal roof panels and insulation as shown on the drawings for the purpose of placing the new Pump No. 7 including items not specifically covered under other bid items to complete the project.

2. Payment of the lump sum bid price for the Roof Removal and Replacement Over Pump Bay No. 7 will be full compensation for all labor, materials, and equipment required to complete the Roof Removal and Replacement as described above, indicated in the specifications and as indicated on the drawings.

3. The payment item for Roof Removal and Replacement Over Pump Bay No.7 shall be Number 4.

E. Compressed Air Piping

1. Measurement of payment for the Compressed Air Piping will be on a lump sum basis for the all new compressed air piping as shown on the drawings required to connect the existing compressed air system to the new Pump No. 7 equipment. This system shall include, but not be limited to valves, air piping, pipe hangers, pneumatic control lines, pneumatically controlled raw water valves and other incidental items as shown on the drawings and indicated in the specifications to complete the air system.

2. Payment of the lump sum bid price for the Compressed Air Piping will be full compensation for all labor, materials, and equipment required to complete the air system as described, indicated above and as indicated on the drawings.

3. The payment item for the Air System shall be Number 5.

F. Fuel Supply and Return Piping

1. Measurement of payment for the Fuel Supply and Return shall be on a lump sum basis for the complete fuel piping as shown on the drawings and as described in this specification. The system shall include, but not be limited to, the following work:

   a. Furnishing and installing all permanent fuel oil piping, valves and specialties shown on the drawings and described in Division 23.

2. Payment of the lump sum bid price for the Fuel Storage and Handling System will be full compensation for all labor, materials, and equipment required to complete the fuel system as described, and indicated above and as indicated on the drawings.

3. The payment item for the Fuel Storage and Handling System shall be Number 6.

G. Climber Type Cleaner & Trash Rack

1. Measurement of payment for the Climber Type Cleaner & Trash Rack shall be on a lump sum basis for the completed racks and cleaners as described in Section 11 82 35. This lump sum shall include, but not be limited to, the assembled trash racks, trash deflector, elevated portable platform, complete rake mechanism, controller and all devices required for a complete cleaner system and trash rack installation.

2. Payment of the lump sum bid price for the Climber Type Cleaner & Trash Rack will be full compensation for all labor, materials, and equipment required to complete the Cleaner System as described, indicated above and as indicated on the drawings.

3. The payment item for all Climber Type Cleaner & Trash Rack shall be Number 7.

H. Pumps, Gears, Engine, Gridcooler & Accessories

1. Measurement of payment for the Pump, Gears, Engine, Gridcoolers, and Accessories shall be on a lump sum basis for the completed Pumping System shown on the drawings and specified in Sections 21 10 00, 20 10 01, 33 45 00, 41 65 10, and 41 65 11. This lump sum shall include, but shall not be limited to, providing the formed suction inlet (FSI) design, pump assembly, pump bearing lubricator, engine, gear reducers, grid coolers, jacket water & after cooler expansion tanks, pneumatic clutch, battery & charger system, control panel, and all other incidental, indicated, or required work in accordance with the drawings, the related specifications, and instructions from the affected manufacturers and suppliers to complete the pumping system.

2. Payment of the lump sum price for the Pump, Gears, Engine, Gridcoolers and Accessories will be full compensation for all labor, materials and equipment required to complete the pumping system as described, indicated above and as indicated on the drawings.

3. The payment item for the Pump, Gears, Engine, Gridcoolers, and Accessories shall be Number 8.

I. Electrical Work

1. Measurement of payment for the Electrical Work will be on a lump sum basis for all electrical work shown on the plans and described in the electrical and other divisions of the specifications. This work shall include, but not be limited to, conduits, wire, cable, boxes, devices, equipment connections, enclosures, supporting devices, grounding, transformers, panel boards, motor controllers, transfer switches, lighting devices, relays, controls, and all permits, tests, inspections and coordination to provide the station with a completely safe working electrical system.

2. Payment of the lump sum bid price for the Electrical Work will be full compensation for all labor, materials and equipment required to compete the Electrical System as described, indicated above and as indicated on the drawings.

3. The payment item for the Electrical Work shall be Number 9.

J. Pump Model Test

1. Measurement of payment for the Pump Model Test will be on a lump sum basis for the completed pump test as described in Section 22 10 01.

2. Payment of the lump sum bid price for the Pump Model Test will be full compensation for all labor, materials construction, equipment and engineering to complete the model test as specified.

3. The payment item for the pump Model Test shall be Number 10.

K. Miscellaneous Site Work

1. Payment for Miscellaneous Site Work shall be a lump sum bid price.

2. Payment will be made monthly as the work proceeds, after presentation by the Contractor of pay estimates and approval by the Engineer showing percent completion for this work. Total payment will be the lump sum price for site preparation, regardless of actual cost to the Contractor.

3. Payment of the lump sum price for miscellaneous site work will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to completion of the work.

4. In the event this Agreement is canceled by the Owner, the Contractor will be paid for the actual costs incurred for miscellaneous site work to the time of cancellation, which costs will not exceed the total lump sum price for the pay item “Miscellaneous Site Work”.

5. There will be no measurement for miscellaneous site work. Miscellaneous site work shall include all site work items not specifically listed as an item number but not limited to selective demolition, site clearing, chain-link fencing and gates, seeding and fertilizing, and dedication sign.

6. Completed and accepted selective demolition, site clearing, chain-link fencing and gates, seeding and fertilizing, and dedication sign will be paid for at a lump sum price for miscellaneous site work, which price shall be full compensation for all materials, equipment, tools, and labor necessary to complete the work.

7. The payment item for Miscellaneous Site Work shall be Number 11.

L. Earthwork

1. Measurement of payment for earthwork shall be on a lump sum basis for all excavation and embankment and backfill as shown on the drawings. This item shall include, but not limited to, excavation and disposal of soil and muck from the intake

basin which shall include volumes of material located from above the indicated existing elevations to below the final required elevations; including excavations above and below normal water surface elevations, installation, maintenance, relocation and removal of gunderboom or silt screens, excavation of area under access bridge to meet proposed elevations, and other excavation, hauling, disposing, handling, as needed to complete excavation necessary to complete the project as shown on the drawings.

2. Payment of the lump sum bid price for the Excavation will be full compensation for all labor, materials, and equipment required to complete the project excavations as described, indicated above as indicated on the drawings.

3. The payment item for the Major and Minor Excavations shall be Number 12.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

1.0 GENERAL

1.01 RELATED WORK

A. DIVISION 0

B. Section 01 33 00 - Submittals, Etc.

1.02 DESCRIPTION

A. These Contract Documents include provisions for use of equivalent materials and equipment. Requests for review of equivalency shall be submitted in accordance with the General Requirements and the Miscellaneous Requirements and as herein specified.

1.03 SUBSTITUTIONS OF MATERIALS OR EQUIPMENT

A. Whenever, in the plans or project specifications, any materials, process or equipment is specified by patent, proprietary or brand name, or name of manufacturer, such wording is intended to establish the quality and type of materials, processes and equipment, and shall be deemed to be followed by the words "or approved equal". Lists of acceptable materials in the plans or specifications are not intended to be comprehensive lists, or in order of preference. The Contractor may offer any material, process or equipment which meets specifications.

B. Requests for substitution of equal products for those specified shall be submitted for approval to the Engineer within 60 calendar days after the award of contract and before installation.

C. Manufactured products shall be installed in accordance with the manufacturer's recommendations. Products, when delivered to the site, shall be labeled as to the manufacturer's name and catalog number; also, products shall have manufacturer's certification that the product conforms to specifications.

D. If required by the Engineer, the Contractor, at his expense, shall have the proposed material tested as to its physical and chemical characteristics, durability, finish efficiency, dimensions, and suitability for its intended use. The method of test shall be subject to approval, and test results shall be reported promptly to the Engineer. Material shall not be installed until approved.

E. No additional payment will be made for revisions in the project made necessary by the substituted equipment, materials or product, and no extension of contract time will be granted because of the use of substituted materials, processes or equipment.

1.04 SAMPLES

A. Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product with integrally related parts and attachment devices.

2. Full range of color texture, and pattern.

B. Label each sample with identification required for transmittal letter.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

3.01 PROCEDURE

A. Submit a separate request for each product, supported with complete data, drawings and samples as appropriate including changes required in other elements of the Work because of the substitution, effect on construction schedule, cost data comparing the proposed substitution with the specified products, comparison if availability of maintenance, service and replacement cost.

1. Any supporting test data or results shall use the same test procedures for the proposed substitution and the specified products to facilitate comparison.

B. Request for substitution constitutes a representation that the Contractor:

1. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.

2. Will provide the same or better warranties, bonds and guarantees for the substitution as for the specified product.

3. Will coordinate the installation of an accepted substitution into the Work and make the Work complete in all respects.

4. Waives all claims for additional costs, related to the substitution which may subsequently become apparent.

END OF SECTION

SECTION 01 26 63

CHANGE ORDERS

1.0 GENERAL

1.01 CHANGE ORDER PROCEDURES

A. Without invalidating the Contract, the Owner may make reasonable changes by altering, adding to, or deducting from the Work, the Contract Price being adjusted accordingly. No claim for extra work or materials shall be allowed and no alteration of or deduction from the work shall be made, unless same is ordered in writing by the Owner.

B. Where changes ordered by the Owner involve a monetary consideration, the Contract shall be adjusted by negotiation with the terms of said negotiation being expressed in a supplemental agreement or Change Order signed by the Owner, the Contractor and the Engineers.

C. If the Owner and the Contractor are unable to reach an agreement as to the monetary consideration of a Contract addition, the Engineers acting as the Owner's representative may order the Contractor to do such work on a force account or time and materials basis.

D. The Contractor shall furnish labor, equipment and materials necessary to complete the work in a satisfactory manner and within a reasonable period of time. For the work performed, payment will be made for the documented actual necessary expense of the following:

1. Field labor and foremen, who are directly assigned to the time and materials work (actual payroll cost, including wages, fringe benefits as established by negotiated labor agreements, and labor taxes as established by law). The cost of labor shall include any payment to or on behalf of the worker for health and welfare, pension, vacation and similar purposes. Where subsistence and travel allowances are required for performance of extra work, the charges shall consist of the actual amount paid to each worker. No other fixed labor burdens will be considered unless approved in writing by the Owner.

2. Material delivered and used on the designated work, including sales tax, if paid by the Contractor or his subcontractor.

3. Rental, or equivalent rental cost of equipment, including necessary transportation, for items having a value in excess of $200. When equipment is not rented, the equivalent rental cost of equipment shall be based on the standard rental rate for Contractor-owned equipment, but in no event shall exceed the locally adjusted rental rates set forth in the "Rental Rate Blue Book for Construction Equipment" and the "Rental Rate Blue Book for Older Construction Equipment" which are published by the Equipment Guidebook Company, P. O. Box 10113, Palo Alto, California 94303. For equipment not listed in said documents, the rental rate shall be as listed for the local section of the Associated General Contractors. If the equipment is not listed by

the Associated General Contractors, the rental rate will be mutually agreed upon in writing between the Contractor and the Owner prior to the use of said unlisted equipment. The reasonable cost of moving equipment onto and off the jobsite shall be included, but equipment rental shall not be paid when the equipment is inoperative due to breakdowns. Individual pieces of equipment or small tools considered as included in the overhead allowance and no additional payment therefor shall be made.

When equipment is used on the extra work for less than five (5) days, daily rates shall be used. When equipment is used on the extra work for more than four (4) days, weekly rates shall apply. Less than four (4) hours of operation shall be considered to be 1/2 day of operation. More than 5 hours of operation shall be considered a day if performed on a single day. Less than thirty (30) minutes of operation shall be considered 1/2 hour of operation.

Rental or equivalent rental cost will be allowed for only those days or hours during which the equipment is in actual use. Rental and transportation allowances shall not exceed the current equipment cost and shall be understood to cover all fuel, supplies, repairs, and renewals.

The Owner reserves the right to furnish such materials and equipment as he deems expedient, and the Contractor shall have no claim for profit or added fees on the cost of such materials and equipment.

4. One percent (1%) for additional bond, when required and approved by the Owner.

5. Additional insurance (other than labor insurance) as required and approved by the Owner.

6. Professional services shall be included in "actual necessary expense" only when the Owner has determined that such services are necessary and the provision of such services has been authorized in advance in writing by the Engineer.

To the preceding actual necessary expenses, there shall be added the following fixed fees for either the Contractor or subcontractor actually executing the work:

A fixed fee of 15 percent (15%) of the cost of Item 1.

A fixed fee of 10 percent (10%) added to the cost of Items 2 and 3.

A fixed fee of 6 percent (6%) added to the cost of Items 4 and 5.

A fixed fee of 10 percent (10%) added to the cost of Item 6.

An additional fixed fee of 10 percent (10%) shall be allowed the Contractor for the administrative handling of portions of the Work that are executed by an approved subcontractor. No additional fixed fee will be allowed for the administrative handling of work executed by a subcontractor of a subcontractor, unless by written permission from the Owner.

The added fixed fees shall be full compensation for the cost of general supervision, overhead, profit, and any other general expense.

If a dispute occurs over payment for work provided on a time and material basis, the dispute shall not be cause of stopping work.

The Contractor shall maintain accurate records for all work performed on a time and material basis. These records will reflect all the actual necessary expenses pertaining to the extra work and shall at all times be available for audit by the Owner.

The Contractor's records shall make clear distinction between the direct costs of work paid for on a time and material basis and costs of other work. The Contractor shall furnish the Engineer report sheets in duplicate of each day's work. The daily report sheets shall itemize the labor, materials and equipment used. The daily report sheets shall provide names, identifications and classifications of workers, the hours worked, the sizes, types and identification numbers of equipment, and hours operated. Daily report sheets shall be signed by the Contractor or his authorized agent and verified by the Engineer.

To receive partial payments and final payment for time and materials work, the Contractor shall submit to the Engineer in a manner approved by the Engineer, detailed and complete documented verification of the Contractor's and any of his subcontractor's actual costs incurred. Material and rental charges shall be substantiated by copies of vendor's invoices. Such costs shall be submitted within thirty (30) days after said work has been satisfactorily completed.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 29 00

APPLICATIONS FOR PAYMENT

1.0 GENERAL

1.01 DESCRIPTION

A. Submit applications for payment to Engineer in accordance with the established schedule of payments required by Conditions of the Contract and Agreement between Owner and Contractor.

B. Adhere to all applicable requirements indicated in - Progress Payments, Retainages and Final Payment clauses in the Conditions of the Contract.

C. Within 30 days after award of contract, Contractor shall furnish to Engineer a schedule of estimated monthly payments. The schedule shall be revised and submitted each time an application for payment varies more than 10 percent from the estimated payment schedule.

1.02 RELATED REQUIREMENTS

A. Section 01 32 16 - Construction Schedules

B. Section 01 77 00 - Contract Closeout

1.03 FORMAT AND DATA REQUIRED

A. Submit itemized applications on completed Application and Certificate for Payment. Blank forms shall be supplied by the Engineer.

B. Provide itemized data on continuation sheets:

1. Format, schedules, line items and values: Those of the Schedule of Values approved by Engineer.

C. A progress report shall accompany all applications.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to the date of submittal of application.

2. Fill in summary of dollar values to agree with the respective totals indicated on the continuation sheets.

3. List all on site stored items.

4. List of all responsible members and officers of the construction company.

5. Execute certification with the signature of an authorized, responsible officer of the Contract firm as required by Owner and Engineer.

B. Continuation Sheets.

1. Fill in total lists of all scheduled component items of Work, with item number and the scheduled dollar value for each item.

2. Fill in the dollar value in each column for each scheduled line item when work has been performed or products stored.

a. Round off values to the nearest dollar, or as specified for the Schedule of Values.

3. List each Change Order executed prior to the date of submission, at the end of the continuation sheets.

C. Progress Reports shall conform to requirements of Section 01 32 16.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Engineer require substantiating data, to justify dollar amounts Contractor shall submit suitable information, with a cover letter identifying:

1. Project.

2. Application number and date.

3. Detailed list of enclosures.

4. Information for stored products including:

a. Item number and identification as shown on application.

b. Description of specific material.

B. Submit one copy of data and cover letter for each copy of application.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01 77 00 - Contract Closeout.

1.07 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to Engineer at the times stipulated in the Agreement.

B. Number: Five copies of each Application.

C. When Engineer finds the Application properly completed and correct, he will transmit a certificate for payment to Owner.

D. All payment requests or invoices must be sent first to the Engineer for review and comment on the proper forms, which are then forwarded to the Owner. Contractors who fail to follow this procedure will not be paid on a timely basis due to the unnecessary delays in re-routing the payment requests.

1.08 RETAINAGE

A. The Owner agrees to make payment to its Contractor promptly sums due under this contract and to retain only such amounts as may be justified by specific circumstances specifically provided for in the construction contract, to the following schedule:

a. Retention of up to ten (10) percent of payments for projects with contract prices of less than $500,000.

b. Retention of five (5) percent of payments for projects with contract prices of $500,000 or more.

1.09 TOTAL PAYMENT

A. Wherever an item of work to be performed under this contract is specified in any of the bid documents as being paid at an item total price, the Contractor shall be paid the entire amount that appears in his bid proposal for that item.

B. Wherever the estimated quantities (i.e., cubic yards of sand, shell, etc.) of materials to be furnished under this contract are shown in any of the documents, including the Proposal, they are given for use in comparing bids and are not to be construed as exact quantities. The Owner reserves the right to increase or diminish these quantities as may be necessary to complete the work contemplated by this contract. The Contractor shall be paid for the actual quantity of items or material used, and payment will be at the respective unit price bid for these items or materials.

C. The sum of the products of approximate quantities multiplied by the unit price bid, constitute the total base bid price or total alternate bid price which sums shall be used in comparison of bids, and the awarding of the Contract.

D. It shall be understood that the total base bid or alternate bid price figure, wherever specified in the bid document, may not reflect the actual amount the Contractor will receive upon completion of the work. This figure shall be adjusted in accordance with the actual quantity of unit price items used.

2.0 <u>PRODUCTS</u>

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

SECTION 01 32 16

CONSTRUCTION AND PROGRESS SCHEDULES

1.0 GENERAL

1.01 WORK INCLUDED

A. The Contractor shall prepare and submit to the Engineer at the Preconstruction Conference and on a monthly basis, estimated construction progress schedules for the Work with subschedules of related activities which are essential to its progress. Provide a minimum of six (6) copies.

1.02 RELATED WORK

A. Section 01 11 00 - Summary of Work

B. Section 01 29 00 - Applications for Payment

C. Section 01 39 19 - Project Meetings

D. Section 01 33 00- Submittals

1.03 FORMAT OF SCHEDULES

A. Prepare schedules in the form of a an MS Project or Primavera Gantt chart.

B. Provide separate horizontal bar for each trade or operation.

C. Identify the first work day of each week and of commencement of each Work Phase.

D. Scale and spacing shall to allow space for notations and future revisions.

E. Minimum sheet size: 11" x 17".

F. Format of listings shall match the table of contents of this Project Manual.

G. Listings shall be in the chronological order of the start of each item of work.

H. Listings shall be identified by major specification section numbers.

I. Listings of items other than major equipment shall include values of each item or portion of work which will not exceed $50,000.

1.04 CONTENT OF SCHEDULES

A. Show the complete sequence of construction by activity.

B. Show the dates for the beginning and completion of each major element of construction and each Work Phase.

C. Show projected percentage of completion for each item, as of the first day of each month.

D. Show values for each item and accumulated values completed at the stages indicated.

1.05 SUBMITTALS

A. Submit six (6) copies of the initial at the Preconstruction meetings.

B. Submit six (6) revised progress schedules monthly with requests for payment.

C. Submit Schedule for Shop Drawings, Product Data and Samples.

D. Include progress reports with each submittal.

1.06 REVISIONS TO SCHEDULES

A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

C. Provide narrative report to define problem areas, anticipated delays and impact on Schedule. Report corrective action taken, or proposed, and its effect, including the effect of changes on schedules of separate contractors.

1.07 DISTRIBUTION

A. Distribute copies of the reviewed schedules to the job site file, subcontractors, suppliers, and other concerned parties.

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

Mobilization on the project site and processing of any Contractor pay request shall not commence until the Engineer has received and approved the Project Work Schedule.

END OF SECTION

SECTION 01 32 23

SITE CONDITIONS SURVEY

1.0 GENERAL

1.01 DESCRIPTION OF WORK INCLUDED

A. The Contractor, prior to mobilizing onto the jobsite, shall conduct a detailed survey of the jobsite, surrounding area and access routes.

B. This survey is intended to document existing conditions with respect to any conditions which may be noticed after construction begins. Post construction conditions shall also be compared to this data.

C. This documentation shall be provided by the Contractor and submitted to the Engineer as preparation to resolve any damage claims which may arise due to the construction of this project. All costs associated with this survey shall be included in other bid items.

D. These records shall become property of the Owner upon delivery to the Engineer or Owner's Representative.

1.02 OWNER'S QUALITY AUTHORITY

The Owner shall have the authority to reject all or any portion of the photographic documentation not conforming to the Specifications. Those rejected portions shall be rephotographed at no additional cost to the Owner.

2.0 PRODUCTS

2.01 COVERAGE OF THE SURVEY

A. Photographs shall be taken of the exterior of all public and private buildings and structures along any pipeline work and within 100' of any excavation or 250’ of any pile driving.

B. The Contractor shall make every attempt to gain permission from property owners for access to private property for documenting preconstruction conditions. If a property owner refuses access after multiple attempts, the Contractor will notify the Engineer and log all contacts with the property owner. The attempts shall include a formal letter and upon refusal, a registered or certified letter to supplement the log of verbal and/or telephone contacts.

C. Elevations shall be taken on house slabs, driveway pavement, walkway paving, sidewalks, and paving elements in street sections adjacent to the project site and within 100' of any excavation or 250’ of any pile driving. These elevations shall be recorded and produced under the supervision of a registered licensed surveyor in the State of the

project site. Elevations on abutting drives and walks shall be taken at approximately 20 foot intervals and at the point of juncture with any structure to which they are attached. In addition, elevations shall be taken of all corners of house slabs along the job route.

D. Video tapes of the access routes shall be made to show existing street and right-of-way conditions. The camera shall be mounted on a tripod or platform upon a vehicle which places the camera approximately 10' above the path being traveled upon. The travel speed of the vehicle shall be no greater than 48 feet per minute. Photographs shall be taken to supplement the video tapes to give more detailed documentation of pre-existing conditions.

E. A carefully prepared log shall be maintained to show the name of the individual taking the photographs, the stationing as shown on the Plans, or as directed by the Engineer, the name of the street, easement or building being documented, the project name, and the direction of travel and the viewing side.

2.02 PHOTOGRAPHS

A. All still photographs shall be taken on digital format.

B. Photographs shall be sharp clear, bright, well focused with accurate colors free from distortion or any other form of picture imperfection.

C. The date, time, and identification number of each photograph shall be displayed onto the electronic media filename and print.

D. The Engineer and Owner shall be furnished with 3 - 8" x 10" color glossy prints of each exposure positioned individually in plastic pages with full descriptions of each photograph (origin, location, etc.) attached to the back of the print. In addition to the photo images, each image shall be provided in an electronic format, stored on CD or DVD with references to the photo provided. The prints and media disc shall be bound in sets in heavy duty 3 ring binders and delivered no later than on the date of mobilization.

E. No photography shall be done during periods of significant precipitation, mist or fog.

F. The photography shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording. Proper flash lighting shall be used inside the buildings and less lighted areas.

3.0 <u>EXECUTION</u>

NOT USED

END OF SECTION

SECTION 01 32 33

CONSTRUCTION PHOTOGRAPHS

1.0 GENERAL

1.01 RELATED WORK

NOT USED

1.02 DESCRIPTION

A. The Contractor shall be responsible for the production of construction photographs showing the regular progress of the Work. The Engineer shall be able to designate the subject of additional photographs as required.

B. Before commencement of the Work and continuing through the duration of the contract, the Contractor shall take not less than ten (10) exposures consisting of different subjects or angles of view for each exposure. The exposures shall be taken from various locations on the construction site for adequate documentation of the Work. The photographer shall attempt to use the same locations for four (4) exposures at each interval. The exposures shall be taken at intervals not exceeding two (2) weeks in duration. The Contractor shall take ten (10) additional exposures at the completion of the Work as directed by the Engineer. All photographs shall be furnished to the Engineer within two (2) weeks after each exposure.

C. All still photographs shall be taken in digital format. Photographs shall be sharp clear, bright, well focused with accurate colors free from distortion or any other form of picture imperfection. The date, time, and identification number of each photograph shall be displayed onto the electronic media and print. The Engineer and Owner shall be furnished with 3 - 4" x 5" color glossy prints (4 photos per page) of each exposure positioned in plastic pages with full descriptions of each photograph (origin, location, etc.) attached to the back of the print. In addition to the photo images, each image shall be provided in an electronic format, stored on CD or DVD with references to the photo provided. The prints and media disc shall be bound in sets in heavy duty 3 ring. No photography shall be done during periods of significant precipitation, mist or fog. The photography shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording. Proper flash lighting shall be used inside the buildings and less lighted areas.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 33 00

SUBMITTAL PROCEDURES

1.0 GENERAL

1.01 RELATED REQUIREMENTS

A. DIVISION 0

B. DIVISION 1

1.02 DESCRIPTION

A. Engineering data covering all equipment and fabricated materials to be furnished under this contract shall be submitted to the Engineer for review after the contractor verifies all applicable field measurements, quantities, dimensions, performance criteria, etc. This data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external operation of connections, anchorages, and supports required, wiring diagrams; piping diagrams; controls; performance characteristics and capacities; and dimensions and clearances needed for installation and correlation with other materials and equipment. If manufacturer's standard drawings are submitted, modify and delete information which is not applicable to the Work. The Engineer will not be required to review incomplete submittals.

B. All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this contract, Contractor's name, date, and references to applicable specification paragraphs and Contract Drawings. By approving Submittals, Contractor represents that he has determined and verified all materials, field measurements and field construction criteria related thereto and that he has checked and coordinated the information within the submittal with the requirements of the Work. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data. Submittals shall reference sheet and/or section numbers of the Contract Documents to which they relate.

C. All deviations from the Contract Documents shall be specifically and clearly identified on each submittal and shall be tabulated in Contractor's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.

D. Contractor shall accept full responsibility for the completeness of each submission, and, in the case of a resubmission, shall verify that all exceptions previously noted by Engineer have been taken into account. In the event that more than one resubmission is required because of failure of Contractor to account for exceptions previously noted,

Contractor shall reimburse Owner for the charges of Engineer for review of the additional resubmission.

E. Any need for more than one resubmission, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Time unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of Engineer to return any submittal within 28 calendar days after its receipt in the Engineer's office.

F. Engineer's review of drawings and data submitted by Contractor will cover only general conformity to the Contract Documents. Engineer's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device, or item shown. Engineer's review of submittals shall not relieve Contractor from responsibility for errors, omissions, or deviations, nor responsibility for compliance with the Contract Documents.

G. Six (6) copies of each drawing and necessary data shall be submitted to Engineer. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.,) to indicate the sequence of the resubmittal.

H. When the drawings and data are returned marked REJECTED or REVISE AND RESUBMIT, the corrections shall be made as required, as noted thereon, and as indicated by Engineer and corrected copies shall be resubmitted. Commence no portion of work requiring submittals until submittal has been approved by Engineer.

I. When corrected copies are resubmitted, Contractor shall, in writing, direct specific attention to all revisions and shall list separately any revisions made other then those called for by Engineer on previous submissions. Resubmittals shall be clearly and obviously labeled as such.

J. When the drawings and data are returned marked REVIEWED or REVIEWED AS NOTED, no additional copies need be furnished. Contractor is responsible for distributing copies to his subcontractors and material suppliers.

1.03 SAMPLES

A. Samples shall be of sufficient size and quantity to:

1. Clearly illustrate the functional characteristics of the product with integrally related parts and attachment devices.

2. Clearly illustrate the full range of color texture, and pattern.

3. Serve as a sample for testing.

B. Label each sample with identification required for transmittal letter.

1.04 SCHEDULE OF MAJOR EQUIPMENT

A. The Proposal Form **may** include a list of the major items of Equipment to be furnished and installed on this project. Each Bidder shall state in the space provided in the Proposal Form the name of the manufacturer of the equipment he proposes to use. Only one manufacturer shall be listed for each item. The successful bidder shall be bound to furnish the particular equipment listed in his proposal and no substitutions will be permitted unless the substitution meets the requirements of the contract and is specifically approved in writing by the Owner.

B. Where manufacturers of this major equipment are mentioned in the specifications followed by the words "or approved equal" any substitution equipment shall be submitted for the Engineer's review. Performance specifications where no manufacturer is mentioned do not require prior review. Structural, electrical and mechanical changes to suit the equipment bid will be the responsibility of, and paid for by, the Contractor.

1.05 EQUIPMENT CONFIGURATIONS

The indicated sizes of equipment shown on the plans and specified herein represent sizes that were used for the design. In the event the Contractor, supplier, or manufacturer changes the size of the equipment, the changes to the adjacent equipment, piping, or required additional wiring in order to provide for adaptation of equipment to the project shall be coordinated by the Contractor and shall be called to the attention of the Engineer at the time of the affected submittal. Any expense incurred in changing equipment sizes shall be borne by the Contractor.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

3.01 AGREEMENT IN PRODUCTION OF SUBMITTALS

A. Contractor agrees that Shop Drawing Submittals processed by the Engineer are not Change Orders; that the purpose of Shop Drawing Submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.

Contractor further agrees that if deviations, discrepancies, or conflicts between Shop Drawing Submittals and the contract documents in the form of design drawings and specifications are discovered either prior to or after Shop Drawing Submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 39 19

PROJECT MEETINGS

1.0 GENERAL

1.01 SCOPE

A. The Owner's Representative may schedule and administer pre-bid and pre-construction meetings, periodic progress meetings, and specially called meetings throughout the progress of the work.

1. Specially called meetings may be held at the job site during normal working hours, as necessary to expedite the progress of the job.

B. The Owner's Representative shall direct individuals attending the meeting to:

1. Prepare agenda for meetings.

2. Distribute written notice of each meeting.

3. Preside at meetings.

4. Record the minutes; include all significant proceedings and decisions.

5. Reproduce and distribute copies of minutes.

C. Representatives of Contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

1.02 RELATED WORK

A. Section 01 77 00 - Contract Closeout

1.03 PRE-CONSTRUCTION MEETING

A. After notification that the contract has been executed and prior to the commencement of the Work at the site, the Owner's Representative shall arrange with the Owner, Using Agency and the Contractor to conduct a Pre-Construction Conference.

B. Location: Project site or where directed by the Owner's Representative.

C. Attendance:

1. Owner's Representative.

2. Using Agency's Representative.

3. Engineer, his Professional Consultants, and his Project Representative.

4. Contractor.

5. Contractor's Superintendent.

6. Principal Subcontractors.

7. Principal Suppliers and manufacturer's representatives as appropriate.

8. Others as Appropriate.

D. The Contractor shall coordinate and be responsible for the attendance of his principal Subcontractors.

E. The Contractor shall furnish at the time of the pre-construction meeting to the Owner's Representative, the Engineer and Using Agency six (6) copies of the following documents:

1. Schedule of Values.

2. List of Subcontractors.

3. List of major material suppliers.

4. Construction Schedule.

5. Procurement Schedule.

6. Shop Drawings and Submittal Schedule

7. Excavation Plan.

F. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:

1. Contractor's tentative schedules.

2. Transmittal, review, and distribution of Contractor's submittals.

3. Processing applications for payment. Application format.

4. Maintaining record documents.

5. Critical Work sequencing.

6. Field decisions and Change Orders.

7. Use of premised, office and storage areas, security, housekeeping, and Owner's needs.

8. Major equipment deliveries and priorities.

9. Contractor's assignments for safety and first aid.

10. Submission of executed bonds and insurance certificates if not previously submitted.

1.04 PROGRESS MEETINGS

A. Progress meetings will be scheduled by the Owner's Representative or the Engineer after consulting with the Owner and the Using Agency. These meetings shall be no more often than one per week as required by progress of the work, exclusive of any other meetings scheduled by the Owner's Representative, Owner or Using Agency.

1. It shall be the responsibility of the Owner's Representative to notify the Owner, Using Agency, and the Contractor of the time, place and date of the "Progress Meeting".

2. It shall be the responsibility of the Contractor to notify all suppliers and subcontractors.

B. The purpose of these regular meetings is to assess, realistically, the current status and progress of the work, to effect coordination, cooperation and assistance in every practical way and to discuss changes in scheduling, and to resolve other problems which may develop. This should maintain the progress of the project on schedule and complete the project within the contract time.

C. These meetings will be called as required during progress of the work.

D. Location of the meetings: The project field office or other location where directed by the Owner's Representative.

E. Attendance:

1. Owner's representative.

2. Using Agency's representative.

3. Engineer, his professional consultants, and his Project Representative.

4. Contractor.

5. Contractor's Superintendent.

6. Principal Subcontractors, and all subcontractors active on the site.

7. Principal Suppliers and Manufacturer's Representatives.

8. Others as appropriate.

F. Suggested Agendum:

1. Review and approve minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Note field observations, problems, conflicts.
4. Identify problems which impede Construction Schedule.
5. Review off-site fabrication, delivery schedules.
6. Develop corrective measures and procedures to regain projected schedule.
7. Revise Construction Schedule as required.
8. Plan progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required to maintain schedule.
11. Review maintenance of quality and work standards.
12. Review proposed changes for the effect on Construction Schedule, completion date, and coordination.
13. Complete other current business.

END OF SECTION

SECTION 01 42 00

REFERENCE STANDARDS AND DEFINITIONS

1.0 GENERAL

1.01 RELATED REQUIREMENTS

NOT USED

1.02 REFERENCE STANDARDS

A. Reference to the standards of any technical society, organization, or association, or to codes of local or state authorities, shall mean the latest standard, code, specification, or tentative standard adopted and published at the date of receipt of bids, unless specifically stated otherwise.

1.03 PROJECT DEFINITIONS

A. OWNER. The Owner of the subject project is Ascension Parish.

B. ENGINEER. The Engineer of the subject project is Burk-Kleinpeter, Inc..

1.04 DEFINITIONS

A. ADDENDUM. A Written revision, correction, interpretation, clarification or supplement to the plans, specifications or other contract documents issued by authority of the Engineer prior to opening bids, which will become a part of the contract.

B. ADVERTISEMENT. A public announcement inviting bids for work to be performed or materials to be furnished.

C. BASE COURSE. The layer or layers of specified material of designed thickness or a subbase or subgrade to support a surface course.

D. BIDDER. An individual, partnership, firm, corporation, or any acceptable combination thereof, or joint venture submitting a proposal.

E. CALENDAR DAY. Every day shown on the calendar, beginning and ending at midnight.

F. CONTRACTING AGENCY. City Council or other governing authority of a Parish, State Office, Agency, Board, Commission, Public Corporation or other political subdivision of the State, in whose name the contract will be executed. The Contracting Agency is further defined in the Notice to Contractors.

G. CONTRACT. The written agreement between Owner and the Contractor setting forth obligations of the parties thereunder, for performance of the prescribed work.

The contract includes the invitation for bids, proposal, contract form and contract bond, specifications, supplemental specifications, special provisions, general and detailed plans; also, any plan changes and supplemental agreements that are required to complete construction of the work in an acceptable manner, including authorized extensions thereof, all of which constitute one instrument.

H. CONTRACT BOND. The approved form of security, executed by the Contractor and his surety or sureties, guaranteeing complete execution of the contract and all supplemental agreements pertaining thereto and payment of all legal debts pertaining to construction of the project.

I. CONTRACT ITEM (Pay Item). A specific unit of work for which a price is provided in the contract.

J. CONTRACTOR. The individual, partnership, firm, corporation or any acceptable combination thereof, or joint venture contracting for performance of prescribed work.

K. EQUIPMENT. All machinery and equipment, with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for proper construction and acceptable completion of the work.

L. EXTRA WORK. An item of work not provided for in the contract as awarded but found essential by the Owner for satisfactory completion of the contract within its intended scope.

M. HIGHWAY, STREET OR ROAD. A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way. Recommended usage in urban areas - highway or street; in rural areas - highway or road.

N. INSPECTOR. The Owner's authorized representative assigned to make detailed inspections of contract performance.

O. ADVERTISEMENT FOR BIDS. The advertisement for proposals for all work or materials on which bids are required. Such advertisement will indicate location and description of the work, and time and place of opening bid proposals.

P. LABORATORY. The Owner's testing laboratory or any other testing laboratory approved by the engineer.

Q. MATERIALS. Any substances specified for use in the construction of the project and its appurtenances.

R. NOTICE TO PROCEED. Written notice to the Contractor to proceed with the contract work, including the date of beginning of contract time.

S. PARISH. The Parish in which the specified work is to be done.

T. PLAN CHANGE. A general term denoting changes to the contract.

U. PLANS. The contract drawings which show location, type, and dimensions of the prescribed work and may include layouts, profiles, cross sections and other details.

V. PROJECT. A specific undertaking of construction as described by the plans and specifications within prescribed limits.

W. PROPOSAL. The offer of a bidder, on the prescribed form, to perform the stated work and to furnish the labor and materials at the prices quoted.

X. PROPOSAL FORM. The prescribed form on which the offer of a bidder must be submitted.

Y. PROPOSAL GUARANTY. The required security furnished with a bid proposal.

Z. RIGHT OF WAY. Land, property or interest therein, reserved for use in constructing, maintaining and protecting an improvement.

AA. SPECIAL PROVISIONS. Additions and revisions to the standard and supplemental specifications covering conditions applicable to the project.

BB. SPECIFICATIONS. The compilation of provisions and requirements for the performance of prescribed work.

Standard Specifications - A book of specifications for general application and repetitive use.

Supplemental Specifications - Additions and revisions to the Standard Specifications.

Project Specifications - All Standard Specifications, Supplemental Specifications, Technical Specifications, Special Provisions and other provisions that are applicable to the project.

Technical Specifications - Requirements pertaining to specific items or methods of performing the work and to quantities and qualities of materials to be furnished, and shall be considered part of the contract.

CC. SPECIFIED. Set forth or stipulated in the plans or specifications or elsewhere in the contract documents; such as materials, equipment or methods.

DD. STATE. The State which the project is being constructed or the Governing body of this state acting through its authorized representative.

EE. STRUCTURES. Bridges, culverts, catch basins, junction boxes, retaining walls, cribbing, manholes, endwalls, buildings, sewers, dams, floodgates, plumbing stations, docks, wharves, levees, boat ramps, pile dolphins, jetties, service pipes, underdrains, foundation drains and other features encountered in the work and not otherwise classed herein.

FF. SUBBASE. The layer or layers of specified or selected material of designed thickness placed on a subgrade to support a base course.

GG. SUBCONTRACTOR. An individual, partnership, firm, corporation, or any acceptable combination thereof, or joint venture, to which the Contractor sublets part of the contract.

HH. SUBGRADE. The surface of a foundation layer upon which the pavement structure and shoulders are constructed.

II. SUBSTRUCTURE. That part of the structure below the bearings of simple and continuous spans, skewbacks or arches and tops of footings or rigid frames, including backwalls, wingwalls and wing protection railings.

JJ. SUPERINTENDENT. The Contractor's authorized representative in responsible charge of the work.

KK. SUPERSTRUCTURE. The entire structure above the substructure including but not limited to the deck, girders, bearings, deck drainage system, etc..

LL. SUPPLEMENTAL AGREEMENT. A written agreement made and entered into by and between the Contractor and the Owner covering work not otherwise provided for, revisions in or amendments to terms of the contract or conditions specifically prescribed in the specifications as requiring supplemental agreements. Such supplemental agreement becomes a part of the contract when approved and properly executed.

MM. SURETY. The corporation, partnership or individual, other than the contractor, executing a bond furnished by the contractor.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

SECTION 01 42 13

ABBREVIATIONS AND SYMBOLS

1.0 GENERAL

1.01 RELATED REQUIREMENTS:

NOT USED

1.02 DESCRIPTION

A. Abbreviations used in the Contract Documents are defined as follows:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACEC	American Consulting Engineers Council
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AFBMA	Antifriction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air Conditioning and Refrigeration Institute
ARIB	Asphalt Roofing Industry Bureau
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWI	American Woodworking Institute
AWPA	American Wood Preservers Association

AWPA	American Wood Products Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Institute of America
BHMA	Builders Hardware Manufacturers Association
BOCA	Building Officials Council of America
CE	Corps of Engineers, U.S. Army
CISPI	Cast Iron Soil Pipe Institute
CMA	Crane Manufacturing Association
CPSC	U. S. Consumer Products Safety Commission
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
CSI	Construction Specifications Institute
DHI	Door and Hardware Institute
EJCDC	Engineers Joint Contract Documents Committee
EPA	Environmental Protection Agency
Fed Spec	Federal Specifications
FDA	Food & Drug Administration
FGMA	Flat Glass Marketing Association
FM	Factory Mutual Engineering Corporation
FMA	Flat Glass Marketing Association
FS	Federal Specifications
FSS	Federal Specifications and Standards, General Services Administration
GA	Gypsum Association
HMI	Hoist Manufacturers Institute
IBBM	Iron Body, Bronze Mounted
ICBO	International Conference of Building Officials
IEEE	Institute Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
ISA	Instrument Society of America
LADOTD	Louisiana Department of Transportation and Development
LSGA	Laminators Safety Glass Association
MBMA	Metal Building Manufacturers Association
MIL	Military Specification
ML/SFA	Metal Lath/Steel Framing Association
MSS	Manufacturers Standardization Society
MUTCD	Manual on Uniform Traffic Control Devices
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NBC	National Building Code
NBHA	National Builders Hardware Association
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association

NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NPA	National Particleboard Association
NPCA	National Pest Control Association
NPT	National Pipe Thread
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NSPE	National Society for Professional Engineers
NWMA	National Woodwork Manufacturers Association
NWWDA	National Wood Window and Door Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDI	Plumbing & Drainage Institute
PFI	Pipe Fabrication Institute
PPI	Plastic Pipe Institute
PS	Product Standards
RCSC	Research Council on Structural Connections
RMA	Rubber Manufacturers Association
SAE	Society of Automotive Engineers
SBCCI	Southern Building Code Congress International
SCPRF	Structural Clay Products Research Foundation
SCS	Soil Conservation Service, U.S. Department of Agriculture
SDI	Steel Deck Institute
SDI	Steel Door Institute
SFPA	Southern Forest Products Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry
SPIB	Southern Pine Inspection Bureau
SSPC	Steel Structures Painting Council
STI	Steel Tank Institute
SWI	Sealant and Waterproofers Institute
SWI	Steel Window Institute
TCA	Tile Council of America
TPI	Truss Plate Institute
UL	Underwriters' Laboratories
US	U. S. Bureau of Standards
WPRS	Water and Power Resources Service
WRI	Wire Reinforcement Institute
WWPA	Western Wood Products Association

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 45 00

QUALITY CONTROL

1.0 GENERAL

1.01 QUALITY CONTROL, GENERAL

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship on this project.

B. Perform work only by persons qualified by equivalent applicable union standards to produce workmanship of the specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

D. Comply with manufacturer's instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, notify and request clarification from Engineer before proceeding.

1.02 SITE INVESTIGATION AND CONTROL

A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the Work due to his failure to comply with this requirement.

B. The Contractor shall inspect related, adjacent, and appurtenant Work and shall report in writing to the Engineer any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair or replacement caused by unsuitable conditions shall be performed by the Contractor at its sole cost and expense.

1.03 INSPECTION OF THE WORK

A. The Work shall be conducted under the general observation of the Engineer and shall be subject to inspection by representatives of the Engineer acting on behalf of the Owner to insure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop or field inspection, as required. The Engineer shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.

B. The presence of the Engineer or any inspector(s), however, shall not relieve the Contractor of the responsibility for the proper execution of the work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Engineer or any inspector(s).

C. All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no materials or articles shall be used in the Work until they have been inspected and accepted by the Owner or his representative. No Work shall be backfilled, buried, cast in concrete, hidden or otherwise covered until it has been inspected. Any Work so covered in the absence of inspector shall be subject to uncovering. Where uninspected work cannot be uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal and reconstruction under proper inspection, and no additional payment will be allowed therefor.

1.04 TIME OF INSPECTIONS AND TESTS

A. Samples and test specimens required under these Specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests, analyses and reporting of results before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens at its own expense. Except as otherwise provided in the Contract Documents, performance of the required tests will be by the Owner, and all costs thereof will be borne by the Owner at no extra cost to the Contractor; except, that the costs of any tests which show unsatisfactory results shall be borne by the Contractor.

B. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide or otherwise cover any Work under the Contract, the Engineer shall be notified not less than 24 hours in advance to request inspection before beginning any such Work of covering. Failure of the Contractor to notify the Engineer at least 24 hours in advance of any such inspections shall be reasonable cause for the Engineer to order a sufficient delay in the Contractor's schedule to allow time for such inspections and any remedial or corrective Work required, and all costs of such delays, including its effect upon other portions of the Work, shall be borne by the Contractor. Payment for items which are built uninspected or unverified may be delayed by the Engineer until satisfactory evidence of compliance is attained.

1.05 SAMPLING AND TESTING

A. When not otherwise specified, all sampling and testing shall be in accordance with methods prescribed in the current standards of the ASTM or related standard entity, as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of inspection which, in the opinion of the Engineer, will insure the Owner that the quality of the workmanship is in full accordance with the Contract Documents.

B. Any waiver of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any technical or qualitative requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the Engineer shall reserve the right to make independent investigations and tests as specified in the following paragraph and, upon failure of any portion of the Work to meet any of the quantitative requirements of

the Contract Documents, shall be reasonable cause for the Engineer to require the removal or correction and reconstruction of any such Work.

D. In addition to any other inspection or quality assurance provisions that may be specified, the Engineer shall have the right to independently select, test and analyze, at the expense of the Owner, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests and analyses made by the Contractor to determine compliance with the applicable specifications for materials so tested or analyzed; provided that wherever any portion of the Work is discovered, as a result of such independent inspection and investigation, and all costs of removal, correction and reconstruction, or repair of any such Work shall be borne by the Contractor.

1.06 RIGHT OF REJECTION

A. The Engineer, acting for the Owner, shall have the right, at all times and places, to reject any articles or materials to be furnished herein which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site. If the Engineer or inspector, through an oversight or otherwise, has accepted materials or Work which is defective or which is contrary to the Contract Documents, such material, no matter in what stage or condition of manufacture, delivery or erection, may be rejected by the Engineer or the Owner.

B. The Contractor shall promptly remove rejected articles or material from the site of the Work after notification of rejection.

C. All costs of removal and replacement of rejected articles or materials from the site of the Work after notification of rejection shall be borne by the Contractor.

1.07 TESTING LABORATORY SERVICES

A. The Owner will select and pay for the services of an independent testing laboratory to perform specified testing quality control and services.

1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.

2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

3. Excluding written protest by the Contractor in advance of processing or use of materials, services of the testing laboratory shall be understood as constituting full acceptance by and approval of the Contractor.

B. Related Requirements

1. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities as mentioned in the Conditions of the Contract.

2. Certification of Products indicated in respective Specification Sections.

C. Testing laboratory inspecting, sampling, and testing is required for, but not limited to:

1. Soils Compaction and Control.

2. Paving.

3. Cast-in-Place Concrete.

4. Structural Steel Welding

5. Metal Fabrications.

6. Concrete Piles.

7. Paintwork.

D. Qualification of Laboratory

1. Meet "Recommended Requirements of Independent Laboratory Qualification," latest edition, published by American Council of Independent Laboratories.

2. Meet basic requirements of ASTM E 329, "Standard Recommended Practice for inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction".

3. Authorized to operate in the State in which the Project is located.

E. Laboratory Duties

1. Cooperate with Engineer and Contractor; provide qualified personnel after due notice.

2. Perform specified inspections, sampling and testing and reporting of results of materials and methods of construction:

   a. Comply with specified standards.

   b. Ascertain compliance of materials with requirements of Contract Documents.

   c. Tests and inspections shall be conducted in accordance with specified requirements and if not specified, in accordance with applicable standards of American Society of Testing and Materials and other recognized authorities as applicable.

3. Promptly notify Engineer and Contractor of observed irregularities or deficiencies of work or products.

4. Promptly submit written reports of each test and inspection; at least one copy each to Engineer, Owner, and Contractor.

5. Perform any additional tests as required by the Engineer or Owner.

F. Limitations of Authority of Testing Laboratory.

1. Laboratory is not authorized to:

a. Release, revoke, alter or enlarge any requirements of Contract Documents.

b. Approve or accept any portion of the Work.

c. Perform any duties of the Contractor.

G. Contractor's Responsibilities

1. Cooperate with laboratory personnel, provide access to Work and to Manufacturer's operations.

2. Provide to the laboratory and to the Engineer the preliminary design mix proposed to be used for concrete and other materials and mixes which require control by the testing laboratory.

3. Furnish copies of Products test reports as requested.

4. Furnish incidental labor and facilities:

a. To provide access to Work to be tested.

b. To obtain and handle samples at the Project Site or at the source of the product to be tested.

c. To facilitate inspections and tests.

d. For protection, storage and curing of test samples.

5. Costs of tests, samples and mock-ups of substitute and specified material, where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Engineer to establish equality qualified with specified items, shall be borne by the Contractor.

6. Notify laboratory and Owner's Representative sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

7. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required:

a. For the Contractor's convenience.

b. When initial tests indicate Work does not comply with Contract Documents.

c. When required by laws, ordinances, rules, regulations, orders or approvals of public authorities.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

SECTION 01 51 00

TEMPORARY UTILITIES

1.0 GENERAL

1.01 RELATED WORK

NOT USED

1.02 TEMPORARY UTILITIES

A. Comply with National Electric Code

B. Contractor shall provide and maintain all temporary utilities such as heating, lighting and electricity for the operation of Contractor's plant or equipment or for any other use by Contractor. Heating, air conditioning and lighting shall be maintained at the project office and project site if applicable until the Work is granted final acceptance. General construction and safety lighting: five (5) foot-candles minimum; and finishing work and testing: twenty-five (25) foot-candles minimum.

C. Contractor shall discover characteristics of available sources of electrical power (voltage, phases, amps, etc.) and shall coordinate with his needs as required.

1.03 TEMPORARY TELEPHONE SERVICE (Not Required)

A. Contractor shall make all necessary arrangements with the telephone utility for telephones in the temporary field office(s) for the duration of Project. All telephone numbers shall be in the name of the Contractor, and all charges after installation shall be billed to and paid by the Contractor.

B. All Contractors and others performing work or furnishing services at the site shall be permitted to use Contractor's telephone without charge for toll-free calls pertaining to the Work.

1.04 TEMPORARY WATER

A. All water (including extensions of lines and connections) required for and in connection with the Work to be performed and for any specified tests of piping, equipment, devices, etc., or for any other use as may be required for proper completion of the Work shall be provided by and maintained at the expense of the Contractor. No separate payment for water used or required will be made and all costs in connection therewith shall be included in the contract bid price.

B. Size piping to supply construction needs.

C. All drinking water on the site during construction shall be furnished by the Contractor and shall be bottled water.

1.05 TEMPORARY SANITARY FACILITIES

A. Contractor shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and other performing work or furnishing services on the Project.

B. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 men. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

1.06 TEMPORARY VENTILATION

A. Provide ventilation to prevent accumulation of dust, fumes or gases and to properly cure materials and disperse humidity.

1.07 MEASUREMENT

There shall be no measurement for Temporary Utilities.

1.08 PAYMENT

Payment for Temporary Utilities will be made under “Mobilization and Demobilization”.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

3.01 REMOVAL

A. Completely remove all temporary utilities when their use is no longer required. Clean and repair damage caused by temporary installation.

B. Relocate temporary facilities during construction as required by progress of the Work at no additional cost to the Owner.

END OF SECTION

SECTION 01 60 00

MATERIAL AND EQUIPMENT

1.0 GENERAL

1.01 RELATED WORK

A. Section 01 66 00 - Storage and Protection

1.02 DESCRIPTION

A. Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type and quality specified or as specifically approved in writing by the Engineer.

3. Manufactured and Fabricated Products:

a. Design, fabricate and assemble in accordance with the best engineering and shop practices.

b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.

c. Two or more items of the same kind shall be identical, by the same manufacturer.

d. Products shall be suitable for service conditions.

e. Equipment Capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

5. Whenever an article, device or piece of equipment specified herein (or as indicated on the Drawings) is referred to in the singular number, such reference shall apply to as many such articles as are indicated on the Drawings or required to complete the installation within the general intent of the Contract Documents.

B. Contractor shall be fully responsible for all materials and equipment which he has furnished, and shall furnish necessary replacements at any time prior to expiration of the Correction Period.

C. Off-site storage arrangements shall be acceptable to Owner for all materials and equipment not incorporated into the work but included in Applications for Payment. Such off-site storage arrangements shall be presented in writing, and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to Engineer.

D. Existing materials and equipment removed, and not reused or suitable for salvage, shall become Contractor's property.

E. Any items damaged in removal, storage or handling through carelessness or improper procedures shall be replaced by Contractor in kind or with new items.

F. Existing materials and equipment removed by Contractor shall not be reused in the Work except where so specified or indicated.

G. All items mentioned in these Contract Documents shall be handled in conformance with this Section, Section 01620, instructions in the related Sections, and manufacturer's literature.

H. The security of Owner furnished equipment shall become the responsibility of the Contractor upon taking delivery of the items at the office of the Owner.

1.03 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of Work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Engineer.

1. Maintain one set of complete instructions at the job site during installation and until Project completion.

B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

2. Do not proceed with such Work without clear instructions.

C. Perform Work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.04 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflicts and delays with Work and conditions at the site.

B. Deliver products in undamaged condition, in manufacturer's original containers or packaging with identifying labels intact and legible. Labels shall indicate manufacturer

and product name, description, mixing and application instructions, limitations, cautions and warnings.

C. Immediately upon delivery, inspect shipments to ensure proper material, color, type, quantities, and to assure compliance with the Contract Documents and approved submittals and that the products are undamaged.

D. Provide equipment and personnel to handle products by methods to prevent soiling or damage to the product or packaging.

1.05 PROTECTION AFTER INSTALLATION

A. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove coverings when no longer needed.

1.06 SUBSTRATE CONDITIONS

A. Contractor shall be responsible for verifying and obtaining proper substrate conditions, tolerances and material alignments to receive applied or attached materials and construction.

B. Substrates shall be sound, clean, dry and free of imperfections or conditions which would be detrimental to receipt of applied materials.

C. Align materials to give smooth, uniform surface planes within specified tolerances and straight, level and plumb surfaces.

D. Inspect substrates prior to installation of applied materials. Correct unacceptable conditions prior to proceeding with work.

1.07 FINISHED SURFACES

A. Finished surfaces shall be clean, uniform and free of damages, soiling or defects in material and finish.

B. Finished surfaces shall match color and texture of samples provided or approved by Engineer.

C. Protection:

1. Protect finished surfaces from damage and soiling during application, drying or curing, as applicable.

2. Provide temporary protective coverings or barriers required.

2.0 <u>PRODUCTS</u>

2.01 EVIDENCE OF COMPLIANCE

A. All material and equipment used in the completion of this work shall be accompanied by certificates of compliance with the applicable requirements of the specifications. These certificates shall state date of manufacture, manufacturer, local representative, component sources and other pertinent specified facts of manufacture.

3.0 EXECUTION

NOT USED

END OF SECTION

SECTION 01 66 00

STORAGE AND PROTECTION

1.0 GENERAL

1.01 RELATED WORK

NOT USED

1.02 DESCRIPTION

A. All materials shall be suitably packaged (in manufacturer's original packaging with labels and seals intact) to facilitate handling and protect against damage during storage.

B. Painted or coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted or coated surfaces which are damaged prior to acceptance of equipment shall be repaired to the satisfaction of the Engineer. If the Engineer deems the damage to be too extensive for repair, the material will be rejected and disposed of by the Contractor at No Direct Pay.

C. Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall accompany each shipment.

1.03 MEASUREMENT

There shall be no measurement for storage and protection.

1.04 PAYMENT

Payment for storage and protection will be made under “Mobilization and Demobilization”.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

3.01 STORAGE, GENERAL

A. Store products, immediately on delivery, in accordance with manufacturer's instructions. Protect until installed.

B. Arrange storage in a manner to provide access for maintenance of stored items and for inspection.

C. Store and handle paints and products subject to spillage in areas where spills will not deface surfaces.

D. Flammable or hazardous materials:

1. Store minimum quantities in protected areas.

2. Provide appropriate type fire extinguishers near storage areas.

3. Observe manufacturer's precautions and applicable ordinances and regulations.

3.02 EXTERIOR STORAGE

A. Provide substantial platforms, blocking, or skids, to support fabricated products above ground; slope to provide drainage. Protect products from soiling and staining.

B. For products subject to discoloration or deterioration from exposure to the elements, cover with impervious sheet material. Provide ventilation to avoid condensation.

C. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.

D. Provide surface drainage to prevent erosion, pollution by mixing and ponding of water.

E. Prevent mixing of refuse or chemically injurious materials or liquids.

3.03 OFF-SITE STORAGE

A. Off-site storage arrangements for Contractor-furnished equipment and materials shall be acceptable to Owner for all materials and equipment not incorporated into to the work but included in Applications for Payment. Such off-site storage arrangements shall be presented in writing and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to Engineer.

3.04 MAINTENANCE OF STORAGE

A. Periodically inspect stored products on a scheduled basis.

B. Verify that storage facilities comply with manufacturer's product storage requirements.

C. Verify that manufacturer's required environmental conditions are maintained continually.

D. Verify that surfaces of products exposed to the elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.

END OF SECTION

SECTION 01 71 13

MOBILIZATION AND DEMOBILIZATION

1.0 GENERAL

1.01 SCOPE

A. The Work shall consist of the preparatory and closeout work of the Contractor's forces and equipment necessary for performing the Work required under the Agreement.

B. It shall include the purchase of contract bonds, insurance, transportation of personnel, equipment, operating supplies, and incidentals to and from the site, establishment and removal of temporary offices, buildings, temporary utilities barricades and enclosures, project signs, security and other necessary facilities at the site; and other preconstruction expenses necessary for the start and closeout of work, excluding the cost of materials.

C. It shall not include mobilization and demobilization for any specific item of work for which payment for mobilization is provided elsewhere in the Agreement.

D. This specification covers mobilization and demobilization for work required by the Agreement at the time of award. If additional mobilization costs are incurred during performance of the Agreement as a result of changed or added items of work for which the Contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the items of work changed or added.

1.02 RELATED WORK

A. Section 01 51 00 - Temporary Utilities

B. Section01 52 13 - Field Offices and Sheds

1.03 MEASUREMENT

No measurement shall be made for mobilization.

1.04 PAYMENT.

A. Payment will be made monthly as the Work proceeds, after presentation of invoices by the Contractor showing his own mobilization costs and evidence of charges of suppliers, subcontractors, and others for mobilization work performed by them. If the total of such payments is less than the lump sum price for mobilization, the unpaid balance will be included in the final contract payment. Total payment will be the lump sum price for mobilization, regardless of actual cost to the Contractor.

B. Payment will not be made under this item for the purchase costs of materials having a residual value, the purchase costs of materials to be incorporated into the project, or the purchase costs of operating supplies.

C. Payment of the lump sum price for mobilization will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to completion of the Work.

D. In the event this Agreement is canceled by the Owner, the Contractor will be paid for the actual costs incurred for mobilization to the time of cancellation, which costs will not exceed the total lump sum price for the pay item "Mobilization".

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING AND SURVEYING

1.0 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor shall provide and pay for field engineering services and field surveying required for Project.

1. Survey work required in execution of Project.

2. Civil, structural or other professional engineering services specified, or required to execute Contractor's construction methods.

1.02 RELATED REQUIREMENTS

A. DIVISION 1

B. DIVISION 2

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. Registered professional engineer or registered land surveyor of the discipline required for the specific service of the Project, licensed in the State of Louisiana and acceptable to the Owner.

1.04 QUALITY CRITERIA

A. Contractor shall perform the following:

1. Verify existing grades prior to beginning site preparation. If existing grades are at variance with drawings, notify Engineer and receive instructions prior to proceeding.

2. Verify limits of the site preparation and earthwork operations. Locate adjacent buildings and appurtenances.

3. Establish bench marks outside of working limits. Establish two benchmarks, located on the project site, as widely separated as possible.

4. Verify locations and levels of buildings and appurtenances; including structural and facing components. Note variation from the indicated locations and levels.

5. Verify batter boards at building corners.

6. Verify utility locations, including new construction and existing active and inactive utilities encountered during construction activity.

7. Verify outside building lines to ensure correct position of buildings and appurtenances on project site. Make required surveys to fix and verify foundation locations and elevations, column centerlines, piers, walls, pits and trenches.

8. Measure any settlement of adjacent and project building monthly during construction operations.

9. Measure deflection in structural members.

10. Coordinate work of all trades where work is concealed above finish ceilings, below finish floors or within walls, particularly where contract drawings are diagrammatic. Coordinate locations of piping, ductwork, conduit, lighting fixtures and similar items.

B. Notify Engineer, in writing of on-site conditions which are at variance with the Contract Documents. Compare variations in locations, level, plumbness and deflection with allowable tolerances given in the Contract Documents.

1.05 SURVEY REFERENCE POINTS

A. The basic horizontal and vertical control points for the Project should be those designated on Drawings. All additional survey, layout, and measurement Work shall be performed by Contractor as a part of the Work. Contractor shall verify all existing grades prior to beginning work on the site.

B. Contractor shall locate verify and protect control points prior to starting work, and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to Engineer.

2. Report to Engineer when any reference point is lost or destroyed, or required relocation because of necessary changes in grades or locations.

3. Require surveyor to replace Project control points which may be lost or destroyed.

a. Establish replacements based on original survey control.

1.06 PROJECT SURVEY REQUIREMENTS

A. Establish temporary bench marks as needed referenced to data established by survey control points. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means.

C. From time to time, as directed by the Engineer, verify layouts by same methods.

D. Contractor shall provide an experienced instrument man, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout and measurement of Work.

E. Contractor shall furnish, without charge, competent men from his force and such tools, stakes, and other materials as Engineer may require in establishing or designating control points, in establishing construction easement boundaries, or in checking survey, layout, and measurement of Work performed by Contractor.

1.07 RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses.

B. Contractor shall keep neat and legible notes of measurements and calculations made by him in connection with the layout of the Work. Copies of such data shall be furnished to the Resident Project Representative for use in checking Contractor's layout.

C. All field notes and layout data shall be recorded in bound field books.

1.08 SUBMITTALS

A. Submit name and address of Surveyor and Professional Engineer to Engineer.

B. On request of Engineer, submit documentation to verify accuracy of field engineering work.

C. Submit certificate signed by Registered Engineer or Surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

D. All field books, notes, and other data developed by Contractor in performing surveys required as part of the Work shall be available to Engineer for examination throughout the construction period. All such data shall be submitted to Engineer with the other documentation required for final acceptance of the Work.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 73 29

CUTTING AND PATCHING

1.0 GENERAL

1.01 DESCRIPTION

A. Contractor shall be responsible for all cutting, fitting and patching, including excavation and backfill, required to complete the Work or to:

1. Make its several parts fit together properly.

2. Uncover portions of the Work to provide for installation of ill-timed work.

3. Remove and replace defective work.

4. Remove and replace work not conforming to requirements of Contract Documents.

5. Remove samples of installed work as specified for testing.

6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

B. Related Requirements are Specified in all other DIVISIONS.

1.02 SUBMITTALS

A. The Contractor shall submit a written request to the Owner's Representative well in advance of executing any cutting or alteration which may affect:

1. The work of the Owner or any separate contractor.

2. The structural value or integrity of any element of the Project.

3. The integrity of effectiveness of weather-exposed or moisture-resistant elements or systems.

4. The efficiency, operational life, maintenance or safety of operational elements.

5. The visual qualities of sight-exposed elements.

B. The request shall include:

1. Identification of the Project.

2. Location and description of the affected work.

3. The necessity for cutting, alteration or excavation.

4. The effect on the work of the Owner or any separate contractor, or on the structural or weatherproof integrity of the Project.

5. Description of the proposed work:

   a. The scope of cutting, patching, alteration, or excavation.

   b. The trades who will execute the work.

   c. Products proposed to be used.

   d. The extent of refinishing to be done.

6. Alternatives to cutting and patching.

7. Cost proposal, when applicable.

8. Written permission of any separate contractor whose work will be affected.

9. Date and time work will be executed.

C. Should conditions of the work or the schedule indicate a change of products from the original installation, Contractor shall submit a request substitution.

D. Contractor shall not undertake any cutting or demolition which may affect the structural stability of the existing facilities without Engineer's concurrence.

2.0 PRODUCTS

2.01 MATERIALS

A. Comply with specifications and standards for each specific product involved.

3.0 EXECUTION

3.01 INSPECTION

A. The Contractor shall inspect existing conditions of the Project, including elements subject to damage or to movement during cutting and patching.

B. After uncovering work, the Contractor shall inspect the conditions affecting the installation of Products, or performance of the work. Beginning of cutting or patching means acceptance of existing conditions.

C. Report unsatisfactory or questionable conditions to the Owner's Representative in writing; do not proceed with the work until the Owner's Representative has provided further instructions.

3.02 PREPARATION

A. The Contractor shall provide adequate temporary support as necessary to assure the structural value or integrity of the affected portion of the Work. Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work during cutting and patching operations.

B. Provide devices and methods to protect other portions of the Project from damage.

C. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

3.03 PERFORMANCE

A. The Contractor shall execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

B. Provide devices and methods to protect other portions of the Project from damage.

C. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

D. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.

E. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.

F. Restore work which has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.

G. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

H. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

1. For continuous surfaces, refinish to nearest intersection.

2. For an assembly, refinish the entire unit.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 77 00

CONTRACT CLOSEOUT

1.0 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Comply with requirements stated in the General and Supplementary Conditions of the Contract and in the Specifications for administrative procedures in closing out the Work.

1.02 RELATED WORK

A. General and Supplementary Conditions of the Contract. Fiscal provisions, legal submittals and additional administrative requirements.

B. Section 01 11 00 - Summary of Work.

C. Section 01 29 00 - Applications for Payment.

1.03 CLEANING

A. Before final acceptance, the Contractor shall remove from the site and adjacent property all surplus materials, weeds, bushes, rubbish and temporary structures trailers, tools, equipment, supplies, and unused or waste materials; shall satisfactorily restore by grading, raking, smoothing, and other necessary operations all property which has been worn, rutted or damaged during the work, and shall leave the site in a presentable condition. Upon completion of work in connection with drainage structures, the Contractor shall remove all obstructions to the flow of water from inside all structures, channels, and culverts whether new or old. No direct payment will be made for this work.

B. Clean all interior and exterior building surfaces and make same ready for use before final inspection and after completion of all building construction operations. Wash and rinse floors. Wash fixtures and polish trim. Restore or replace all damaged or defaced surfaces to original condition. Clean all equipment.

C. Remove all temporary labels.

D. Clean site. Sweep paved areas.

E. Remove all waste and surplus material from site.

F. Roads, fences, and other facilities damaged or deteriorated because of Contractor's operations shall be repaired.

G. Contractor shall be responsible for and will clean up at his own expense any streets or roadways which have debris, mud, stone, etc., as a result of construction on this project.

1.04 SUBSTANTIAL COMPLETION

A. When Contractor considers the Work is substantially complete, he shall submit to the Engineer (5 copies each):

1. A written notice that the Work, or designated portion thereof, is substantially complete.

2. A list of items to be completed or corrected.

3. Prepare and file a request for Certificate of Use and Occupancy with the Building Department.

B. Within a reasonable time after receipt of such notice, the Engineer will make an inspection to determine the status of completion.

C. Should the Engineer determine that the Work is not substantially complete:

1. Engineer will promptly notify the Contractor in writing, giving the reasons therefor.

2. Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Engineer.

3. Engineer will reinspect the Work.

D. When the Engineer finds that the Work is substantially complete, he may:

1. Prepare and deliver to the Owner a notification of Substantial Completion on an appropriate form with the Contractor's list of items to be completed or corrected as verified and amended by the Engineer before final payment.

2. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when Engineer considers that the Work is substantially complete, he will countersign and deliver to the Owner and the contractor a definite notification of Substantial Completion with a revised list of items to be completed or corrected.

1.05 COMPLETION VIDEO

A. The Contractor shall deliver a satisfactory video tape with the preconstruction and post construction information. Final payment (retainage) shall not be paid until receipt of the video.

1.06 FINAL INSPECTION

A. When Contractor considers the Work is complete, he shall submit written notification that (5 copies):

1. Contract Documents have been reviewed.

2. Work has been inspected for compliance with Contract Documents.

3. Work has been completed in accordance with Contract Documents.

4. Equipment and systems have been tested in the presence of an Owner's representative and are operational.

5. Work is completed and ready for final inspection.

6. All items noted from the Substantial Completion inspection have been completed or corrected.

B. Contractor shall also submit (5 copies each):

1. Certificate of Use and Occupancy.

2. Certificate of approved final inspection for all applicable mechanical, electrical, plumbing, equipment, etc. as required by state and local authorities.

C. Engineer will make an inspection to verify the status of completion with reasonable promptness after receipt of such notification.

D. Should Engineer consider that the Work is incomplete or defective:

1. Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.

2. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written notification to Engineer stating that the Work is complete.

3. Engineer will reinspect the Work.

E. When the Engineer finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals, including Application for Final Payment.

1.07 REINSPECTION FEES

A. Should Engineer perform reinspection due to failure of the Work to comply with the claims of status of completion made by the Contractor:

1. Owner will compensate Engineer for such additional services.

2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.08 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

A. Project Record Documents.

B. Warranties, Guarantees and Bonds. All warranty periods shall begin on the date of Final Acceptance.

C. Operations & Maintenance Manuals and Data, 3 copies each, bound in labeled stiff back ring binders. Include for all equipment and controls.

D. Executed Service Contracts.

E. Spare parts and Maintenance Materials.

F. Reports of all required tests and demonstrations.

G. Keys to all locks and locksets.

H. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions.

1.09 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the Engineer.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous Change Orders.

b. Quantity reconciliations.

c. Penalties and Bonuses.

d. Deductions for liquidated damages.

e. Deductions for reinspection payments.

f. Deductions for overtime inspection payments.

g. Other adjustments.

3. Total Contract Sum, as adjusted.

4. Previous payments.

5. Sum remaining due.

C. Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.10 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the General and Supplementary Conditions of the Contract.

1.11 SUPPLEMENTAL LIQUIDATED DAMAGES

A. After the establishment of a date of Substantial Completion, the Contractor shall have 30 days to complete any outstanding items of Work remaining to be completed or corrected as listed on a final punch list made a part of the Substantial Completion Package. If upon expiration of said 30 days the outstanding items of Work have not been completed, liquidated damages in the amount agreed to in this contract will be reinstated for every day in which the outstanding items of Work have not been completed. Furthermore, the Owner shall not release monies withheld until all outstanding items of Work have been completed.

2.0 PRODUCTS

NOT USED

3.0 EXECUTION

NOT USED

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Sections:
1. Division 01 Section "Site Survey Conditions" for final property survey.
2. Division 01 Section "Contract Closeout" for general closeout procedures.
3. Divisions 02 through 41 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:

a. Intermediate Construction Submittals: Submit one paper copy sets of marked-up record prints and one set of plots from corrected record digital data files at the 30%, 60% and 90%. Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting is acceptable.
b. Final Submittal: Submit one paper copy set of marked-up record prints. Print each Drawing, whether or not changes and additional information were recorded.

2. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

B. Reports: Submit written report weekly indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Engineer determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Engineer for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Engineer.
e. Name of Contractor.

2.2 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Product Data as paper copy.

1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy.

1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Submittal: Submit one copy of current record drawings at 30%, 60% and 90% construction intervals to the Architect.

C. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer's reference during normal working hours.

END OF SECTION

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at the **Project site**.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Predemolition Photographs or Video: Submit before Work begins.

1.5 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

D. Survey of Existing Conditions: Record existing conditions by use of **measured drawings and preconstruction photographs**

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. The contractor shall unscrew the existing roof panels and unbolt the existing roof purlins to create the opening to install the new pump. The contractor shall not be allowed to mechanically or torch cut any materials for this selective demolition.
2. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
3. Dispose of demolished items and materials promptly.

B. Removed Items
1. The following items shall be removed from the project:
   a. The existing PBR-Style 22 Ga. Metal Roof Panels and associated roof panel screws.
      1) The Contractor shall unscrew the existing roof panels from the underlying support purlins.
      2) Tearing, cutting, ripping, etc. shall not be allowed for removal of the existing roof purlins.

C. Removed and Salvaged Items:

1. The following items shall be Removed and Salvaged
   a. The existing cover for Pump #7 including all bracing, structural members, plates, bolts, etc.
2. Below is the schedule of work items for items designated to be Removed and Salvaged
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers.
   c. Store items in a secure area until delivery to Owner.
   d. Transport items to Owner's storage area as **designated by Owner**.
   e. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. The following items shall be Removed and Reinstalled

a. The existing building purlins, clips, nuts and bolts shall be removed and reinstalled. The Contractor shall furnish new material in-kind if any items are damaged during the removal process.
b. The Contractor shall label each member and provide a plan drawing noting the location of each member prior to removal. The plan shall be submitted to the Construction Manager for their records.

2. Below is a schedule of work items designated to be Removed and Reinstalled.
   a. Clean and repair items to functional condition adequate for intended reuse.
   b. Pack or crate items after cleaning and repairing. Identify contents of containers.
   c. Protect items from damage during transport and storage.
   d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, **cleaned** and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site **and legally dispose of them in an approved landfill**.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Glass-fiber blanket insulation.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 F

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Knauf Insulation.
5. Owens Corning.

B. Vinyl faced, Glass-Fiber Blanket Insulation for Metal Buildings: ASTM C 991, Type I, Flexible Glass fiber Insulation for Metal Buildings, ASTM E 136, ASTM C 1338, UL 723.
   1. R-value of 19.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

3.4 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.5 INSULATION SCHEDULE

A. Vinyl Faced, glass-fiber blanket insulation. Install 6” vinyl faced fiberglass metal building insulation over un-conditioned spaces in Pump House over metal building roof purlins.

END OF SECTION 07 21 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 074113 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal roof panels.

1.2 PERFORMANCE REQUIREMENTS

A. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples: For each type of exposed finish required.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, based on input from installers of the items involved.

B. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with energy performance requirements specified in "Performance Requirements" Article.

1. Submit evidence of meeting performance requirements.

C. Product test reports.

D. Field quality-control reports.

E. Warranties: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty Certificates

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: **Two** years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Coating: Galvalume

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 FIELD-INSTALLED THERMAL INSULATION

A. Refer to Division 07 Section "Thermal Insulation."

2.3 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed

fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 EXPOSED-FASTENER, LAP-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

    a. Architectural Metal Systems.
    b. Berridge Manufacturing Company.
    c. Butler Manufacturing; a BlueScope Steel company.
    d. McElroy Metal, Inc.
    e. Metal Sales Manufacturing Corporation.
    f. Or Approved Equal.

2. Profile: PBR-Style R-Panel
3. Material: Galvalume steel sheet, 22 ga thickness.

    a. Color: Match Existing Panels

4. Major-Rib Spacing: 12” o.c.
5. Panel Coverage: 36”.
6. Panel Height: 1 ¼”.

2.5 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 24 ga thickness. Provide flashing and trim as required to seal against weather and to

provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

2.6 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.2 THERMAL INSULATION INSTALLATION

A. Refer to Division 07 Section "Thermal Insulation."

3.3 METAL ROOF PANEL INSTALLATION

A. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
2. Lap ribbed or fluted sheets one full rib corrugation.
3. Provide metal-backed neoprene or EPDM washers under heads of exposed fasteners bearing on weather side of metal roof panels.
4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
   a. Provide fasterners at a maximum spacing of 12” O.C. at each existing purlin.
   b. Provide fasteners at a max spacing of 7” at special zones as shown on the Pre-Engineered Building Shop Drawings included.

5. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
6. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
7. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weatherproof to driving rains.
8. At panel end splices, nest panels with minimum 6-inch (150-mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.5 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074113

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 72 00

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

A. Division 07 – Metal Roof Panels

1.3 SUMMARY

A. This Section includes the following:

1. Preformed flashings.
2. Penetration through roof or walls to have boot installed. Pipe flashing shall be by Pipe Master or approved equal material EPDM.

1.4 SUBMITTALS

A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

1.5 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate layout and installation of roof accessories with interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

1.9 WARRANTY

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PREFORMED FLASHINGS

A. Pipe Flashings: flexible pipe flashing system with a pre-applied sealing gasket.

1. Product:

a. DEKTITE EZi-Seal by ITW Buildex
b. Prior Approved Equal

2. Diameter: As indicated

PART 3 - `

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
2. Verify dimensions of roof openings for roof accessories.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory

installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Install roof accessories to fit substrates and to result in watertight performance.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

E. Preformed Flashing Installation:

1. Secure to roof membrane according to vent and stack flashing manufacturer's written instructions.

2. Verify that flashing is compatible with specified roofing subsection states.

3.3 TOUCH UP

A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Division 9 painting Sections.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.4 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION 07 72 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 09 91 23

PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. The Work includes all labor, materials and equipment necessary to complete the work specified herein, including surface preparation, painting and finishing of interior and exterior exposed items and surfaces throughout Project, except as otherwise indicated. Also included is field painting of exposed bare and covered pipes and exposed steel except as otherwise indicated.

B. Paint exposed surfaces whether or not colors are designated in schedules except where material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas. If color or finish is not designated, the Architect will select these from standard colors available for materials systems specified.

C. The terms "paint" or "painting" as used in this section means all coating systems materials including primers, sealers, stains, oil, alkyd, latex, vinyl, polyurethane, epoxy and enamel-type paints and the application of these materials.

D. All items not to be painted shall be fully protected from paint, over-spray, solvents or any damage due to painting work.

E. Areas to paint include the following, but are not necessarily limited to:

1. Hollow metal doors and frames (Man Doors and Overhead Coiling Doors)
2. Access panels, electric panels, miscellaneous trim, and surfaces not pre-finished or excluded specifically.
3. Mechanical piping, fuel tanks, etc. furnished in prime coats. Paint to match adjacent surface.
4. Any misc. Carbon Steel not factory finish coated or galvanized.
5. For priming of Structural Steel and Bar Joist see sections 05 12 00 and 05 21 00.

F. The Contractor shall examine the Specifications for the various other trades and shall thoroughly familiarize himself with all their provisions regarding painting. All surfaces that are left unfinished by the requirements of the other Sections, except “Items Not Included” in this Section, shall be painted or finished as part of the Work covered by this Section.

1.3 RELATED WORK

1. Division 5 Sections for all exposed steel members with primers specified in this Section.

2. Division 8 Sections for factory priming windows and doors with primers specified in this Section.

1.4 SUBMITTALS

A. Submit a complete list of products and product data on each product indicating manufacturer, brand name, quality and type of paint for each surface to be painted as per Section 01 33 00.

B. Product Data: For each type of product indicated.

1. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance. Submittals shall include the following performance data as certified by a qualified testing:

a.	Abrasion	Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.
b.	Adhesion	Elcometer Adhesion Tester.
c.	Exterior Exposure	Exposed at 45 degrees facing ocean.
d.	Hardness	ASTM D3363-74
e.	Humidity	ASTM D2247-68
f.	Salt Spray (FOG)	ASTM B117-73

C. Samples for Initial Selection:

1. Submit duplicate 12” x 12” samples for each color selection for each type of paint as per schedules for this Section. One approved sample of each color shall be kept at the job office.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.5 QUALITY ASSURANCE

A. Product manufacturer shall specialize in manufacturing quality paint and finish products. All paint material if possible shall be manufactured by one company.

B. Installer shall be a company specializing in performing work in this section with minimum 5 year commercial painting experience.

C. Paints and coatings shall not settle excessively, cake or thicken in the container. Any such material shall be removed from the site and not used.

D. All work in this section shall meet applicable requirements and recommendations of Painting and Decorating Contractors of America (PDCA).

E. This Work shall be scheduled and coordinated with other trades and shall not proceed until other Work and/or job conditions are as required to achieve satisfactory results.

F. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Approved paints shall be delivered in labeled, sealed, and undamaged containers. Labels shall include manufacturer name, paint type, brand color, coverage, surface preparation, drying time, clean up, color designation, mixing and reducing instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F .

1. Take all necessary precautions to prevent fire, explosions, and other damage.
2. All rags and paint or solvents must be stored in closed metal containers at all times.
3. Store all paint materials in a single location, and as per manufacturer's recommendations.

1.7 SYSTEM INSPECTION TESTING

A. All surface preparation and repairs shall be approved by the Architect or Owner's Representative before primer is applied.

B. After application of each coating in the specified system and its surface has cured, measure its thickness with a properly calibrated Nordson Microtest Dry Film Thickness Gauge, or equivalent. (Use an instrument such as a Tooke gauge if a destructive tester is deemed necessary). Follow standard method for measurement of dry paint thickness with magnetic gages as outlined in Steel Structures Painting Council's SSPC-PA2-73T. The Architect shall, at his direction, use the Contractor's or his own equipment to perform similar inspections.

C. Make as many determinations as needed to ensure the specified thickness values in each typical area. To all surfaces having less dry film thickness than specified, apply additional coat(s) at no extra cost to Owner to bring thickness up to specifications.

D. For immersed, interior surfaces, a non-destructive holiday detector (not to exceed 67.5 volts or that suggested by the coating manufacturer) shall be used. All identified pinholes shall be repaired in accordance with the manufacturer's printed recommendations and then re-tested.

E. Painting contractor shall permit Owner's representative and/or paint and coating manufacturer (as requested by Owner) to inspect his work for conformance to this specification. Owner reserves the right to reject all work which does not comply with this specification.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:

1. Strictly comply with manufacturer's recommendations as to conditions under which coatings can be applied.
2. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F for 24 hours prior to, during, and after application.
3. Do not apply coating in areas where dust is being generated. Surfaces shall be free of foreign matter. Spaces shall be dust free and broom clean.
4. Lighting shall be adequate as required for proper application, provided by applicator as necessary to supplement temporary lighting. Paint only during daylight hours.
5. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
6. Do not paint porous surfaces which have a moisture content above 12%.
7. Ventilate interiors during application and drying.

B. Protection:

1. Cover or otherwise protect all finished work of other trades and surfaces not being painted. Repair damaged surfaces to the satisfaction of the Architect.
2. Remove finish hardware, accessories, light fixtures and cover plates, factory finished work, and similar items. Replace upon completion of painting.
3. Prevent any fire hazards. Remove empty paint containers from site.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ameron/PPG
   2. ICI Devoe (Canada).
   3. ICI Paints.
   4. Sherwin Williams
   5. Tnemec
   6. Approved Equal.

C. Gloss levels for paints required are as follows (ref. National Paint & Coatings Association - NPCA):

Sheen Level	Test Method	Gloss Range
Flat	85 degree meter	Below 15
Eggshell	60 degree meter	5 to 20
Satin	60 degree meter	15 to 35
Semi-Gloss	60 degree meter	30 to 65
Gloss	60 degree meter	Over 65

2.2 MATERIALS

A. Provide best quality "first line" grade of each various type of coating as regularly manufactured by acceptable paint materials manufacturers. Do not use coatings having a lead content. Paint thinners and tints shall be products of same manufacturer as paints and shall be pure, best quality products. Contractor shall be responsible for compatibility of materials.

B. Submit paint schedule of acceptable manufacturer's products to the Architect.

C. Coatings shall be ready mixed unless the products are field catalyzed coatings. Process pigments to a soft paste consistency capable of being readily and uniformly dispersed to a homogeneous coating. Good flow and brushing properties; capable of drying or curing free of streaks or sags.

D. No request for substitution will be considered which decreases the film thickness specified and/or the number of coats or changes the generic type of coating.

E. Application equipment items are not required to be new, but they shall be adequate and commensurate for the work and workmanship required herein.

F. Provide all required ladders, scaffolding, drop cloths, maskings, scrapers, tools, sandpaper, dusters and cleaning solvents as required to perform the work and achieve the results specified herein.

2.3 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.4 PRIMERS/SEALERS

A. Alkali-Resistant Primer: MPI #3.

1. VOC Content: E Range of E2.

B. Bonding Primer (Water Based): MPI #17.

1. VOC Content: E Range of E2.

C. Bonding Primer (Solvent Based): MPI #69.

1. VOC Content: E Range of E2.

D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint system indicated.

2.5 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E2.

B. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E2.

2.6 EXTERIOR ALKYD PAINTS

A. Exterior Alkyd Enamel (Flat): MPI #8 (Gloss Level 1).

1. VOC Content: E Range of E1.

B. Exterior Alkyd Enamel (Semigloss): MPI #94 (Gloss Level 5).

1. VOC Content: E Range of E1.

C. Exterior Alkyd Enamel (Gloss): MPI #9 (Gloss Level 6).

1. VOC Content: E Range of E1.

2.7 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.

1. VOC Content: E Range of E1.

B. Manufacturer:

1. Hillyard Chemical Company
2. Prior Approved Equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. All surfaces must be dry and free of foreign matter, grease, oil, dust, and surface defects before applying any paint or coating. Surfaces must be as required to obtain a sound sustaining bond between the surface and the coating.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
2. Remove mildew with approved solution.
3. Repair minor surface defects.

4. Remove all rust from surfaces to be painted.

D. Moisture content of surface to be painted, shall not exceed twelve percent (12%). If moisture content is between eight percent (8%) and twelve percent (12%), prime with alkali resistant primer in place of specified primer.

E. All paint and coating materials must be thoroughly stirred and mixed.

F. Touch up all shop applied primers. All surfaces of steel or ferrous material that will become inaccessible after installation or by adjacent construction shall be fully coated prior to such inaccessibility.

G. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

H. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Each coat of paint shall be applied uniformly and completely over the entire surface with proper spreading rate listed by the related paint manufacturer.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Roller Applied Paint: Proper skill must be used to avoid all sags or lapping and excess paint lines from edge of roller. When cutting in with a brush is required, these areas must be of same texture, color and hiding as adjacent areas to assure good uniform, consistent appearance.

F. Fill all voids and achieve a smooth surface. Pinholes will not be acceptable.

G. Exposed piping, conduits, ductwork, hangers and related or similar materials shall be painted.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of paint materials with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. Protect all painted surfaces from damage and soiling until Final Acceptance of project.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 GUARANTEE

A. All materials and workmanship for work in this section shall be guaranteed for one (1) year from the date of final acceptance of the project.

3.7 PAINTING SCHEDULE

A. INTERIOR PAINT SYSTEMS

1. Interior Metal Doors and Frames

   a. 1 coat Pro-Cryl Universal Primer @4.0 mils DFT.
   b. 2 coats Sher-Cryl HPA High Performance Acrylic @4.0 milsDFT/.

B. EXTERIOR PAINTING SCHEDULE

1. Hot Dipped Galvanized-Metal Substrates: Alkyd System: MPI EXT 5.3B.

   a. Prime Coat: Cementitious galvanized-metal primer.
   b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
   c. Topcoat: Exterior alkyd enamel (semigloss).

2. Exterior Ferrous Metals
   1 coat Pro-Cryl Universal Primer @4.0 mils DFT
   2 coats Sher-Cryl HPA High Performance Acrylic @4.0 milsDFT/coat

3. Fuel Oil System Ferrous Metals: Portions of the fuel carbon steel piping system that are not covered by containment piping shall receive the following surface preparation and coatings:
   1) Abrasive Blast to Commercial Blast Standards in accordance with SSPC-SP6
   b) 1st – TNEMEC or Equal Series 66 Epoxy Polyamide Hi-Build, 4.0-6.0 mils D.F.T.
   c) 2nd – TNEMEC or Equal Series 71 Polyester Polyurethane 1.5-2.5 mils D.F.T.

4. Compressed Air System Ferrous Metals: The compressed air piping, interior and exterior surfaces of the receiver and receiver supports shall receive the following surface preparation and coatings:
   1) Abrasive Blast to Commercial Blast Standards in accordance with SSPC-SP6
   b) 1st – TNEMEC or Equal Series 66 Epoxy Polyamide Hi-Build, 4.0-6.0 mils D.F.T.
   c) 2nd – TNEMEC or Equal Series 71 Polyester Polyurethane 1.5-2.5 mils D.F.T.

5. Engine Coolant System Ferrous Metals: The carbon steel portions of the engine coolant piping and piping supports shall receive the following surface preparation and coatings:
   1) Abrasive Blast to Commercial Blast Standards in accordance with SSPC-SP6
   b) 1st – TNEMEC or Equal Series 66 Epoxy Polyamide Hi-Build, 4.0-6.0 mils D.F.T.
   c) 2nd – TNEMEC or Equal Series 71 Polyester Polyurethane 1.5-2.5 mils D.F.T.

6. High Heat portions of Exhaust Piping and Exhaust Supports: All high heat portions except stainless steel shall receive the following surface preparation and coating:
   a) Abrasive Blast to remove all rust and scale in accordance with SSPC-SP6.
   b) Ist - Primer – Silicone, TNEMEC or Equal Y-5541 Silicone Hi-Temp Primer – 0.9 mils
   c) 2nd – diffuse, silicone, TNEMEC or Equal Y-5542 Silicone Hi-Temp Primer – 0.7 mils.
   d) 3rd - diffuse, silicone, TNEMEC or Equal Y-5542 Silicone Hi-Temp Primer – 0.7 mils.

7. Portions of the exhaust system support that are not intended to be galvanized and are subjected to moderate temperatures (below 200 deg. F) shall receive the following surface preparation and coatings:
    a) Abrasive Blast to Commercial Blast Standards in accordance with SSPC-SP6
    b) 1st – TNEMEC or Equal Series 66 Epoxy Polyamide Hi-Build, 4.0-6.0 mils D.F.T.
    c) 2nd – TNEMEC or Equal Series 71 Polyester Polyurethane 1.5-2.5 mils D.F.T.

8. Miscellaneous Ferrous Metal

This system shall be used for exterior of fuel storage tanks, the vertical drainage pump accessories, engine and gear and other exposed ferrous surfaces of all equipment and items not specified to be coated with any other coating.

a. Abrasive blast to commercial blast standards in accordance with SSPC SP-6.

b. 1st - Series 66 Epoxy Polyamide Hi Build, 4.0-6.0 Mils D.F.T.

c. 2nd – Series71 to Polyester Polyurethane 1.5-2.5 Mils D.F.

9. Coal Tar Epoxy

1. This system shall only be used for the interior of vertical drainage pump below grade, floating boom piles above elevation (-) 20.0, floating boom assembly, exterior of ductile iron raw water piping, permanent steel sheet pile above El. (-) 10.0 and other items required to be coal tar coated.

2. Abrasive blast to near white condition in accordance with SSPC-SP-10.

3. 1st - Coal tar epoxy, Series 46-H-413, 8-10 Mils D.F.T.

4. 2nd - Coal tar epoxy Series 46-H-413, 8-10 Mils D.F.T.

END OF SECTION 09 91 23

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 11 05 13

COMMON MOTOR REQUIREMENTS FOR EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, alternating-current, small and medium, squirrel-cage induction motors, installed at equipment manufacturer's factory, and motors shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices and features to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in equipment schedules or Sections.

B. Comply with NEMA MG 1 unless otherwise indicated.

C. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Controllers:

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 11 05 13

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 11 82 35

AUTOMATED RAKE SCREEN CLEANER

1.0 GENERAL

1.01 WORK INCLUDED

A. The bar screen, concrete structure and deflection barrier for Pump No. 7 are already in place. The Contractor shall provide a climber type trash screen cleaner for the suction inlet opening of Pump Bay 7 and provide all ancillary equipment required to permit the installation of the screen cleaner for Bay No. 7 without major disruptions to the operation of the cleaner installed in Bay No. 6.

B. This equipment shall distribute the collected debris from the climber screen rake mechanism onto the trash screen discharge/intake bridge roadway at Elevation 6.75.

1.02 RELATED WORK

A. DIVISION 1 - GENERAL REQUIREMENTS

1.03 REFERENCES

A. ASTM

B. ANSI

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01 33 00.

B. The Contractor shall submit, upon completion of the installation, a written report stating the bar rack cleaner has been properly installed, tested, and is ready for full time operation upon completion of the installation by the Contractor. This shall include coordination with the manufacturer and installer of the bar rack cleaner to insure a complete working mechanism.

1.05 FIELD MEASUREMENTS AND COORDINATION

A. The Contractor shall make measurements and study adjacent existing equipment and structures to complete the installation with actual final field conditions.

1.06 SYSTEM PERFORMANCE

A. The bar (trash) rack cleaner shall be capable of removing all collected debris from the bar (trash) rack and deposit the debris on the trash apron above. The equipment furnished shall clean and remove debris from incoming storm water by means of a traveling rake which removes and elevates the debris to a discharge mechanism. The bar screen shall be cleaned by the rake engaging the bar screen from the upstream side at the channel invert and removing debris on its upward travel.

1.07 SUBMITTALS

Submit shop drawings and product data under provisions of Section 013 33 00. The Contractor shall provide evidence that the manufacturer has five (5) similar installations in a Drainage application all within a 100-mile radius of the proposed project and that the manufacturer has a minimum of 10 years' experience fabricating units of this type.

1.08 OPERATION & MAINTENACE DATA

The Contractor shall provide the services of a factory-trained, qualified representative of the equipment manufacturer, for a period of not less than 2 hours, to instruct the station employees in the operation and maintenance of this equipment. The Contractor shall provide three (3) operation and maintenance manuals for review and for the Engineer use prior to final acceptance of the project.

2.0 PRODUCTS

2.01 MATERIALS

A. All bolting shall be accomplished with 304 Stainless Steel unless the manufacturer requires high strength bolts to warrant the equipment. If high strength bolting is necessary, other stainless steel fasteners may be used.

B. The rake assembly, side frame, and guide rails shall be fabricated from A-36 Steel. All bolting shall be accomplished with 316 Stainless Steel unless the manufacturer requires high strength bolts to warrant the equipment. If high strength bolting is necessary, other stainless steel fasteners may be used.

2.02 SCREEN CLEANER DESIGN CRITERIA

A.	Channel Width: (Including Clear Width, Side Frames and Shimming Allowances)	25' – 0"
B.	Channel Depth:	23' – 0"
C.	Channel Invert to Operation Level:	25' – 9"
D.	Rake Elevation at Bottom of Stroke:	Channel Invert - El. -19.00
E.	Maximum Water Level:	4' – 0"
F.	Discharge Height (To Top of Trash Deflector)	12' – 0"
G.	Bar Rack Construction:	
	1. Bar Width	½"
	2. Bar Depth	9"
	3. Clear Spacing	4"
	4. Material	A36 hot dip galvanized
	5. Bar Screen Angle	60º

H. Rake Speed: 17 FPM minimum

I. Lifting Capacity per Cycle: 150 lbs./ft. of bar screen width, minimum

J. Design Wind Load: Standard building code, latest edition.

K. Rake shall be capable of moving out from the bar screen 2.25 feet to raise large objects.

2.03 QUALITY ASSURANCE

A. The Contractor shall provide the services of a factory-trained service engineer to assist in the installation and start-up of the screen cleaner and to train personnel in the operation and maintenance of the equipment. The equipment manufacturer shall include the cost of this service in his bid and shall itemize the amount of time and cost required to accomplish this work in his bid proposal to the Contractor.

B. The screen cleaner shall be furnished by a manufacturer with a minimum of ten years experience in manufacturing mechanical bar screen cleaners including a minimum of three years experience in manufacturing the specific positive action cleaners described herein.

D. The screen cleaners shall be a Climber Screen® Mechanical Bar Screen Model IVS as manufactured by Infilco Degremont, Inc., Richmond, VA., or Engineer approved equal.

E. Any drawings or re-engineering required to accommodate an approved equal mechanism will be the responsibility of the Contractor. All submittals must be approved by the Engineer, and no contract time extensions will be granted for this work.

2.04 BAR SCREEN CLEANER

A. Cleaner Mechanism

The equipment furnished shall positively clean and remove debris from the bar screen with a traveling front rake which will elevate and discharge the debris down a trash ramp to the access road for later removal. The cleaner shall be designed so that no moving parts are permanently below the maximum design liquid surface of 6.75 feet water height, nor shall any electrical component not intended for permanent immersion be submerged in water at any time. Those parts normally immersed in liquid shall be constructed of Type 304 stainless steel. The design shall ensure that maintenance and repair can be accomplished at the operating ground level. The cleaner mechanism shall consist of side frames, pin racks, rake assembly, (with guide rollers, cogwheels, and drive components).

B. Drive Motors

There shall be two (2) synchronized electrical drive motors, one at each side frame. The electrical drive motors shall be 7-1/2 HP, 230/460 volt, 3-phase, 60 Hertz, severe duty, TEFC, 1.15 service factor, with Class F insulation with Class B temperature rise, and tropical installation treatment. The motors shall be U.L. approved for Class 1, Group D, Division 2. Motors shall be squirrel cage induction brake motors complying with NEMA or DIN Standards. Each motor shall have a 120 volt space heater.

1. Motor Starters

   a. Motor starters shall be Allen Bradley open type, full voltage reversing starters and shall be installed in the new interior screen cleaner control enclosure. Starters shall be sized appropriately for the supplied drive motors and shall be protected by circuit breaker type motor circuit protectors.

   b. Every motor starter shall be equipped with a 120 volt control power transformer as noted on the Drawings. The control power transformer shall be encapsulated, shall include integrally mounted primary and secondary fuses, and shall be grounded.

   c. All starters shall have a red "Run" pilot light mounted on the door. Pilot control shall be Start/Stop pushbuttons with nameplates as required by the Drawings.

   d. All motor starter units shall be equipped with three (3) ambient compensated overload relays with external reset button. Relay heaters shall be sized per actual motor full load current as determined at the jobsite.

   e. Each gear reducer should be rated for a maximum design output torque at not less than 53,100 inch-pounds at the normal output shaft rpm of 8.1. Gear reducer bearings shall be anti-friction with oil bath lubrication. The motor shall contain a spring-loaded electromechanical brake released by energization of the operating coils simultaneously with starting the motor. Brake motor shall comply with either NEMA or DIN Standards. The drive system shall move with the rake assembly. Drive systems, which are stationary and drives which relay on a reversible motor during normal operation are not acceptable.

C. Rake Assembly

The debris shall be removed from the bar screen by a rake assembly with teeth designed to engage the openings of the bar screen. The rake assembly shall be supported by the main drive shaft and attached to the two “Cog Wheels” which rotate on and are supported by the pin rack. The rake arm assembly shall be held to the bar screen by a heavy-duty Belleville spring washer assembly or by heavy duty coil springs during the cleaning stoke and shall be held in alignment with guide rollers which travel in channel-type tracks attached to the side frames. The rake mechanism shall be so designed that the rake can climb over and be free of an object which cannot be moved. After the object has been bypassed, the rake shall engage with and continue to clean the bar screen. If the object cannot be bypassed, a limit switch shall stop the drive and send an overload alarm to the main control panel. The rake mechanism shall be designed to be reversed by a manually operated switch to free the mechanism of any overload allowing the object causing the overload to be removed by other means. When the overload has been corrected the drive may again be operated by manual pushbutton activation.

D. Side Frames

The side frame shall be a minimum 3/8-inch thick A-36 carbon steel plate construction, suitably reinforced to support the required loads. The frame shall be securely fastened to the concrete channel. A-36 carbon steel structural supports and cross members shall be provided to facilitate anchoring and leveling the mechanical bar screen cleaner to the supporting structure. Back bracing is specifically excluded. Each side frame shall have a pin rack, consisting of steel bolts fitted with hardened and ground bushings, designed to mesh with the “Cog Wheel”.

E. Termination Box

An outdoor waterproof NEMA 4X stainless steel termination box mounted on the screen cleaner tie member and accessible from the upper catwalk. The box shall contain all termination points required to connect the main control panel and local control station to the screen cleaner with adequate box size for conduits entering and leaving. The terminal points shall be identified and wired to the requirements of Section 10 of these Specifications.

F. Flexible Cable

The flexible cable on the screen cleaner to reach the rake assembly shall be installed along the side frame in a traveling cable system. This cable shall be furnished with an outer jacket similar to Bosflex control and power cable and shall be suitable for outdoor installation and shall be resistant to the injurious effects of ultra violet radiation. Cable shall be carried by a totally enclosed carrier equal to IGUS, Inc. E-Chain Carrier System.

G. Controls

The screen cleaners shall be provided with the following electrical controls and equipment for single cleaner operation. However, the design shall be configured such that an additional cleaner can be added to the system without replacement of the installed unit. The cleaner controls shall be as follows:

1. A main control panel is existing and the new controls for the Pump No. 7 screen cleaner will be placed in this panel.
2. Relays contactors, switches, and other components shall be mounted to a back panel.
3. Terminals shall be arranged for the separation of power and control wiring. The requirements for wire and terminations shall be furnished to the requirements of Section 26 of these Specifications.
4. The control panel has a single point power feed with main service fused switch. The main circuit branches to the new screen cleaner controllers shall have a motor circuit protector, motor contactor for forward direction, a motor contactor for reverse direction, motor overload blocks for each individual drive motor. The amber pilot lamp shall indicate that the panel is live when the main switch is closed. The amber lamp is existing for the new starter that shall indicate conditions of thermal overload. The reset push button for the new cleaner is existing for the new starter to reset trips from thermal overloads. The lamps and buttons for the new screen are existing.
5. Screen cleaner operation shall be provided only at the local control stations. A remote stop switch and the pilot lights are in the main control panel.

    a) The local control stations shall be constructed of stainless steel (NEMA 4X) including a lift-up protective hood located over the station control components. The individual stations shall each have an amber light (indicating overload) and a REVERSE-OFF-FORWARD SELECTOR SWITCH with spring return from the reverse position. These stations shall be furnished to the requirements of Section 26 of

these Specifications and shall have name plates of 3/16” high white letters on a black background laminated plastic attached with minimum of two #40 stainless screws to front cover.

b) Additional electrical and control equipment furnished by the manufacturer shall include:

(1) Space heaters in the drive unit.

(2) End of travel limit switches – 1 per unit.

(3) Bottom of travel limit switches – 1 per unit.

(4) Motor torque overloads – 2 per unit.

H. Painting

All surfaces (except for mating surfaces and stainless steel) shall be blast cleaned to a near white finish, removing all dirt, rust-scale and foreign materials in accordance with Specification SSPC-SP10. Cleaned surfaces shall be shop primed with one (1) coat of Tnemec Epoxyline primer 66-1121 to 3-5 mils dry film thickness. Finish with one (1) coat Tnemec 66 Hi-Build Epoxyline to 4-6 mils dry film thickness. All gear boxes, motors and controls shall have manufacturer’s standard paint.

I. Spare Parts

The cleaner manufacturer shall supply the recommended spare parts for one unit. Spare parts shall include two (2) cogwheels, one hundred (100) pin rack rollers, fifty (50) pin rack bushings, two (2) proximity switches, and one (1) gear motor.

All spare parts shall be properly protected for long periods of storage and packed in containers that are clearly identified with indelible markings as to contents and with this contract name and number.

J. Submittals

The following documents shall be submitted in duplicate to the Engineer by the Contractor within seven (7) days of his bid.

1. Name of climber screen manufacturer supplying the equipment.

2. A list of equipment to be furnished by the climber screen manufacturer with a brochure describing the equipment.

3. General specifications on the equipment.

4. A list of previous installations. This list shall only include climber type screens and not other miscellaneous equipment.

5. Preliminary erection drawings showing structural system for cleaner equipment and the method to be used for attaching the equipment to the existing structural system.

6. The following documents shall be submitted to the Engineer by the bar screen cleaner manufacturer within ten (10) weeks after the work order is issued.

   a) Shop drawings.

   b) Detailed erection drawings.

   c) Wiring diagrams.

   d) Detailed installation procedures.

   e) Operating instructions

   f) Complete design calculations bearing the seal of a Louisiana Professional Engineer.

K. Anchor Bolts

All anchor bolts, nuts and washers are to be supplied with cleaners.

L. Warranty

Contractor shall provide warranty, either himself or through cleaner manufacturer, to correct all defects in material or workmanship by repair or replacement F.O.B. jobsite for a period of one (1) year from date of Substantial Completion of the Contractors completion.

2.05 TRIAL OPERATION

A. The Bar Screen Cleaner shall be installed by the Contractor. After installation is complete, the Contractor, the Owner's Operating Department representative, the Engineer and the climber screen technical representative, shall test the bar screen

cleaner as directed by the Owner. The Contractor shall adjust the climber screen to meet the requirements of the Owner, the Engineer and the Manufacturer's Installation Representative. The points to be observed shall include but are not limited to the following:

1. Direction of operation of the rake

2. Length of motor cable when rake is in operation.

3. The setting of the circuit components and switching magnets.

4. The overload safety devices.

5. All of the above must comply with the manufacturer's instructions and tolerances.

B. Any deficiencies to be corrected and any adjustments required shall be made by the Contractor at his expense.

3.0 EXECUTION

3.01 CLEANER INSTALLATION

A. All equipment installed on this Contract shall be properly located to line and grade, as shown on the Drawings, and shall be leveled, plumbed and otherwise positioned in accordance with the recommendations of the equipment manufacturer and as specified herein. Where requirements specified herein are more stringent than, or otherwise exceed in precision the recommendations of the equipment manufacturer, these Specifications shall govern.

B. All equipment installation work shall be performed by competent, experienced mechanics.

C. All work shall comply with the requirements of precision and tolerances specified herein and shall in this and all other respects be subject to the final approval of the Engineer.

D. The Contractor shall take all necessary measurements to establish the centerline and elevation of the units as called for on the Drawings.

E. Upon completion of erection and the Owner's acceptance of the alignment checks, including operation of each cleaner through three cycles to check for smooth operation, the supports shall be grouted in.

3.02 CLEANER ADJUSTMENT

Before equipment is offered for acceptance, carefully check frame and hardware to see that they are in perfect alignment, fit and operation. Do all necessary refitting and adjustment. Properly adjust current limiting device torque overload and proximity switches to insure proper cut-out.

3.06 CLEANER CLEANING

Remove all non-permanent labels and markings.

Repair all damaged finishes.

Clean exposed surfaces.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Bronze ball valves.
   2. Carbon Steel ball valves.
   3. Iron gate valves.

B. Related Sections:

   1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
   2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:
1. Handwheel: For valves other than quarter-turn types.
2. Handlever: For quarter-turn valves NPS 2 and smaller.
3. Wrench: For ball valves below walkway grating with square heads. Furnish Owner with 1 wrench for every 5 ball valves, for each size square plug-valve head.

4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 CARBON STEEL BALL VALVES (COMPRESSED AIR SYSTEM)

A. Three-Piece, Full-Port, Carbon Steel Valves with Stainless Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Conbraco Industries, Inc.; Apollo Valves.
b. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 1000 psig.
c. Body Design: Three piece.
d. Body Material: Carbon Steel.
e. Ends: Threaded.
f. Seats: PTFE or TFE.
g. Stem: ASTM A 276 Stainless Type 316.
h. Ball: ASTM A 276 Stainless Type 316.
i. Port: Full.

2.3 IRON, SINGLE-FLANGE BUTTERFLY VALVES (ENGINE COOLANT/RAW WATER)

A. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Ductile-Iron Disc:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.

b. American Valve, Inc.
c. Conbraco Industries, Inc.; Apollo Valves.
d. Cooper Cameron Valves; a division of Cooper Cameron Corporation.
e. Crane Co.; Crane Valve Group; Center Line.
f. Crane Co.; Crane Valve Group; Stockham Division.
g. DeZurik Water Controls.
h. Flo Fab Inc.
i. Hammond Valve.
j. Kitz Corporation.
k. Legend Valve.
l. Milwaukee Valve Company.
m. Mueller Steam Specialty; a division of SPX Corporation.
n. NIBCO INC.
o. Norriseal; a Dover Corporation company.
p. Spence Strainers International; a division of CIRCOR International, Inc.
q. Sure Flow Equipment Inc.
r. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
   a. Standard: MSS SP-67, Type I.
   b. CWP Rating: 200 psig.
   c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
   d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
   e. Seat: NBR.
   f. Stem: One- or two-piece stainless steel.
   g. Disc: Nickel-plated or -coated ductile iron.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

3.5 HIGH-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 TO 250 PSIG)

A. Pipe NPS 2 and Smaller:

1. Ball Valves: Three piece, full port, carbon steel with stainless-steel trim.

3.6 ENGINE COOLANT & RAW WATER VALVE SCHEDULE

A. Pipe NPS 12 and Smaller:

1. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Ductile-Iron Disc. See Section 22 11 13.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Pipe positioning systems.
8. Equipment supports.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

D. Welding certificates.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pre-galvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.
   c. Flex-Strut Inc.
   d. GS Metals Corp.
   e. Thomas & Betts Corporation.
   f. Unistrut Corporation; Tyco International, Ltd.
   g. Wesanco, Inc.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Hot-dipped galvanized.
8. Paint Coating: Alkyd.
9. Plastic Coating: PVC.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger

and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

4. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24 , requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.

19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 (if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

R. Use powder-actuated fasteners instead of building attachments where required in concrete construction.

S. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 22 10 00

VERTICAL PUMPS, AXIAL-FLOW PROPELLER TYPE

1.0 GENERAL

1.01 SUMMARY OF WORK INCLUDED

A. The work provided for herein consists of designing, model testing, coordination of, furnishing, delivering and, unloading ONE (1) axial flow, propeller type vertical pumps with a nominal capacity of 1,076 CFS, complete. The pump shall be of such design that will require no significant modifications, alterations or additions to the pumping station and/or suction bays.

B. All items of equipment specified under this Section and related sections comprise the pumping package and as such shall be purchased from the pump supplier by the Seller as an integral package complete with diesel engine, engine grid cooler, right angle gear, horizontally offset parallel gear, pump lubricator, base plate, sole plates, and all auxiliaries. See specific sections on the diesel engine, grid cooler, gears, and model test for complete specifications on these items.

C. The Pump shall be vertical shaft, flower pot type, single stage, axial flow with propeller type impellers. Pump shall be capable of being operated with no water in the pump sump for short periods (15 minute maximum) without harm to the pump. The pump shall be complete from formed suction intake (FSI) attachment through the discharge, and the connection to the gear base plate. The pump shall have flanges in the vertical planes as shown on the drawings. Pump shall be Patterson Pump Co. Model 132 AFV, or approved equal.

D. TABLE OF CONTENTS - SECTION 22 10 00

PARAGRAPH	PAGE NO.
PUMP PERFORMANCE	3
PUMP DESIGN CRITERIA	4
SUBMITTALS DUE IMMEDIATELY AFTER RECEIPT OF BIDS	5
ALTERNATIVES	8
OPERATION CONDITIONS	8
INSTALLATION, OPERATION AND MAINTENANCE DATA	8
QUALITY ASSURANCE	8
DELIVERY, STORAGE AND HANDLING	9
COORDINATION	9
MATERIAL LISTS, TOOLS AND SPARE PARTS	9
MATERIALS	10
CURVED STATIONARY VANES	12
IMPELLER CASING	12
IMPELLER	13
STUFFING BOX	14
BOWL BEARING AND BOWL BEARING HOUSING	14
PUMP SHAFT	14
DIFFUSER CASING	15

FSI SUCTION CONNECTION 15
BASE PLATE 15
SOLE PLATE 16
PUMP TO REDUCER GEAR COUPLING 16
DISCHARGE COLUMN 17
BOWL COUPLINGS, COUPLING HOUSING 17
INTERMEDIATE BEARING, INTERMEDIATE BEARING HOUSING 17
BRONZE SLEEVE TYPE BEARINGS 17
SHAFT HOUSING 19
FASTENERS AND CONNECTIONS 19
FLANGES 20
WELDING 20
CASINGS, CASTINGS AND FORGINGS 21
MACHINE WORK 21
FINISHES 22
PROTECTION OF THE SURFACES 22
PREPARATION (SHOP ASSEMBLY) 22
INSTALLATION 23
FIELD QUALITY CONTROL 24
DEMONSTRATION 25

1.02 RELATED WORK

A. SECTION 22 10 00 DRAINAGE PUMPS - ENGINES

B. SECTION 33 45 00 DRAINAGE PUMPS - GEAR REDUCERS

C. SECTION 33 45 01 DRAINAGE PUMPS – GRID COOLERS

D. SECTION 22 10 01 DRAINAGE PUMPS - PUMP MODEL TEST

1.03 REFERENCES

A. ASTM

B. ASME

C. ANSI

D. AWWA

E. ASA

1.04 PUMP PERFORMANCE

A. The 1,076 CFS pump furnished shall have the minimum characteristics tabulated in the following table:

Cond. No.	Suction Pool Elevation	Head: Pool to Weir in Feet	Flow: CFS	Minimum Bowl % Effic.	Remarks
1	2.0	3.25	1,172	86.9	Low Head
2	0.0	5.25	1,127	88.9	Average Head
3	(-)2.0	7.25	1,076	89.5	Design Storm
4	(-)5.0	10.25	981	86.9	High Head

The maximum NPSH required by the pump at the impeller datum shall not exceed 27' at any and all of the above four (4) conditions. All Performance shall be based on a pump vertical discharge to a broad crested weir at elevation 5.25.

The pump manufacturer shall provide bowl total head calculations that include all FSI, weir and pump losses.

B. Minimum submergence over the pump impeller (El. (-) 6.00 +/-) is approximately 4.0 feet with an elevation (-) 2.00 low water level. The pump shall be capable of pumping to a low water elevation of (-) 5.00. The final pump impeller setting shall be established by the pump manufacturer within the structural limits shown. However, the pump shall discharge to a weir elevation shall not be above El. 5.25.

C. All elevations referred to in these specifications, or on the plans, are in feet, above (plus) or below (minus) N.A.V.D. 88 (National Geodetic Vertical Datum). The elevations shown in the table shall take precedence over water surface elevations shown in the drawings for computing pump head conditions.

D. The liquid to be pumped is storm water and the pool-to-pool heads shown in the table are defined as the vertical distance in feet between the water surface elevation in the suction basin and the water surface elevation at the discharge weir and do not include any pump losses, suction and discharge losses, and velocity head losses. All losses from the suction pool to the discharge weir water level shall be charged against the pump. The design shall be based on total dynamic head.

E. Pump speed shall not exceed 150 RPM.

F. The design and speed of the prototype pump shall be such that no objectionable cavitation, vibration or vortices in the sump shall occur at any of the conditions specified above and the model test of the pump shall demonstrate operation free of cavitation at all conditions as defined by a sudden drop in efficiency (from the overall trend) of more than 3% with the submergence indicated and with the pump impeller at

the elevation shown on the drawings. The suction pool elevation at the various conditions are shown in the table.

G. The model test specified in Section 22 10 01 shall be completed and accepted by the Owner and Engineer before production of the prototype pump is started. Prior model test report for this station and specified design criteria can be submitted for review and approval by Engineer.

H. No cavitation, loss of performance, or objectionable vibration shall occur under any of the special conditions given in the cavitation tests requirements of the pump model test specifications.

I. During normal pump startup, the suction pool will be at El. 0.0 N.A.V.D.88, and pump pool to pool head at the discharge weir water surface shall be assumed to be 6.5 feet. Under this condition, the pump, engine and gear arrangement shall be capable of delivering the quantity of water described above without any assistance from external priming devices, etc.

J. The Contractor shall guarantee to the Owner that the pump will meet the performance described above and in accordance with the sump conditions and weir arrangement depicted in drawings.

K. It is the responsibility of the Contractor to supply a pump, engine, and gear unit with starting torque characteristics such that the pump can be readily started and establish the pump performances stated above with the diesel engine specified.

1.05 PUMP DESIGN CRITERIA

A. The pump shall be vertical, single stage axial flow, propeller type impeller with an impeller bowl I.D. of 107.25”. The design of the pump shall be such that the suction of the pump shall connect to an existing Formed Suction Intake (FSI) constructed of Reinforced concrete. Pump manufacturer shall be responsible for matching the existing field conditions and will take whatever field measurements are necessary to insure a proper fit to the existing structure and support rings already in place.

B. Thrust loads including the static weight of the rotating element and the pump hydraulic thrust shall be carried by a vertical solid shaft with the thrust loads transmitted to thrust bearings in the right angle gear.

C. The pump shall be driven by a diesel engine through a horizontally offset parallel gear and a right angle reduction gear. The parallel offset right angle gear shall allow the mounting of a pneumatic rotating element on the input shaft that will transmit air pressure to the engine PTO mounted constriction type clutch. No gear assembly arrangement will be allowed that utilizes the installation of this rotating element within the right angle gear housing.

D. The pump shall be designed and sized in complete conformance with these specifications and the Standards of the Hydraulic Institute. Where conflicts exist between Hydraulic Institute requirements and these specifications, the requirements of these documents shall govern.

E. The performance cycle of the pump shall be a constant duty cycle.

F. The water to be pumped will be relatively turbid and may contain some sand, silt and vegetative trash capable of passing the trash racks. The water temperature will not exceed 85°F.

G. Definitions and standard practices for drainage water pumps shall be as defined and set forth in "Standards of Hydraulic Institute", , as adopted and published by the Hydraulic Institute, 6 Campus Dive, Parsipanny, NJ 07054-4406.

H. Maximum Drawdown: The pump to be furnished under these specifications shall be capable of satisfactory operation without instability at all condition points of capacity and static heads with the water surface in the intake, as shown in the performance subsection.

I. The Contractor may submit the pump manufacturers own design for modifications of the intake immediately below the pump, providing it fits or can be incorporated into the existing structure below the pump. Any changes in design shall be performed at no additional cost to the Owner. The Owner shall have the option of accepting or rejecting any such proposals submitted and his decision shall be final. All performance, model testing and other provisions of the specifications shall apply to such designs submitted.

J. The design shall be such that installation, removal, and maintenance can be accomplished by a motor crane mobilized on the station intake bridge or on a marine vessel in the discharge channel. The pump, including the impeller and diffuser element shall pass through the 144 inch octagonal opening, or other size opening required in the pump support floor at Elevation +12.25. The pump removal shall be accomplished by removing the right angle gear and gear shafting, but will not require the aid of a diver or entrance into the suction bay to release the pump from its FSI connection.

1.06 SUBMITTALS DUE IMMEDIATELY AFTER RECEIPT OF BIDS

A. The Bidder shall submit with his Proposal, on the appropriate line of the Schedule of Major Equipment, the Name of the manufacturer of the pump proposed to be supplied under this Contract. The pumping capacity and Model Number must also be shown as indicated on the Schedule. The Apparent Low Bidder shall, within 5 days after the Opening of Bids, submit the pump manufacturers dimensional outline drawings, catalog data and other information on the pump and shall include at least the following technical pump data. This data must be supplied in duplicate with the Submittal. Failure to comply with this requirement may cause the Bid to be informal. The following shall apply:

1. Dimensional outline drawings

2. Catalog data

3. Table of expected performance including flows, bowl total head and bowl efficiency. Calculations shall include all losses from the FSI through the discharge weir using the flows indicated in Section 1.04.A.

4. Name of pump manufacturer.

5. Weight of each major component, total pump system weight, weight and hydrostatic loads at each support point.

6. Weight of entire rotating assembly.

7. Length of rotating assembly.

8. Weight and dimensions of heaviest component of pump.

9. Length of the longest component of pump.

10. Materials of construction.

11. Number and location of bearings, type, proposed bearing design, and recommended maintenance procedure.

12. Impeller diameter.

13. Pump Speed.

14. Coupling type and complete data.

15. Catalog material and descriptive literature on pump and drive components.

16. Lubricator detail and settings.

B. The Apparent Low Bidder shall submit, within 21 days of the Bid Opening, complete performance data on his selected pump showing head, capacity, BHP, efficiency and NPSHR at the full constant duty speed of the engine.

C. The Contractor shall guarantee to the Owner that the sump design, pump setting shown on the drawings, and discharge chamber geometry are compatible with his pump offering, considering the duties specified.

D. The Contractor shall have a system torsional and critical speed analysis made of the pumping unit consisting of pump, gear, engine, shafting and connecting couplings to demonstrate that the system will accelerate to and operate at rated speed and decelerate to rest without vibration or other unacceptable dynamic characteristics. The analysis shall include a table of critical RPM's. The operating RPM shall be a minimum of 20% under the first critical RPM. The drive system analysis and report shall be satisfactorily completed and submitted to the Engineer before final approval of the pump, engine, and gear. This report shall be submitted after award at an early date so it can be reviewed and approved. The Contractor may submit a previously completed analysis specific to this station and specified design criteria for review if available.

E. The Contractor shall provide evidence in their submittal to show that the impeller and diffuser proposed have been model tested in the vertical configuration at the equivalent capacity and head range required for the prototype, and that their total dynamic head, capacity, BHP, efficiency, and NPSHR characteristics are precisely

known. Only bids meeting the above requirement will be considered. The bidder shall also furnish certified curves and printed data based on such model tests, showing flow rate in gpm, Total Head (TDH), Brake Horsepower, Efficiency, and NPSH required by the Pump. In lieu of performing a model test, submission of a prior model test report for this station and specified design criterial will be accepted.

F. With known impeller and diffuser characteristics, the resulting pool to weir level performance depends upon the calculated system losses of the suction and discharge weir.

G. The pump manufacturer shall be responsible for determining all system losses and the total head on the pump.

H. The Contractor shall state the overall system loss used to determine his pool-to-weir level performance. Losses shall be based on the arrangement shown on the Drawings and shall include all losses from the USACOE Type 10 FSI to the discharge weir when pumping with suction elevations as shown in the pump performance table. To calculate the system losses, the pump manufacturer shall use only established hydraulic loss data which can be properly applied to the pump and weir in question.

I. Since the calculated system losses are of such importance, the Owner reserves the right to verify the bidder's system losses.

J. If the Engineer finds the calculations of the system losses in the case of any bids are in error, then such submittals will be rejected. The findings of the Engineer shall be final.

K. The Contractor shall submit satisfactory evidence of the pump manufacturer's ability to design and construct the pump called for in these specifications including lists of comparable installations etc. No proposal will be accepted unless the pump manufacturer has similar pump bowls with diameters no less than 72 inch diameter, in service for a sufficient length of time as judged by the Engineer to establish past performance.

L. The Contractor shall certify that the pump, motor, shafting and connecting couplings will accelerate to and operate at rated speed and decelerate to rest without vibration or other unacceptable torsional, critical speed and dynamic characteristics and all critical speeds are a minimum of 20% above the pump operating speed.

M. The Contractor shall furnish the pump manufacturer's calculations insuring that the pump operating speed is a minimum of 20% below the critical speed.

1.07 ALTERNATIVES

A. The pump inlet design is based on all flow entering the pump through a formed concrete Formed Suction Intake (FSI). This FSI is based on the U.S. Army Corps of Engineers Type 10 geometries and all physical intake models used to test the intake conditions on this project has used this geometry for the vortices studies performed. The Contractor will provide a pump to match the existing conditions of the FSI as exists in the field.

1.08 OPERATION CONDITIONS

B. The horsepower and torque required by the pump during the high head condition (#4) shown by the pump speed-torque curve shall be the basis for determining the required output torque of the engine during this condition.

C. The minimum rated nameplate continuous horsepower of the engine shall be not less than 110% of that required to operate the pump at the capacities and heads specified under subparagraph 1.04, conditions 1, 2, 3, and 4, but in any case shall not be less than the continuous horsepower mentioned in Section 41 65 10 - Diesel Fueled Engine Pump Drives

1.09 INSTALLATION, OPERATION AND MAINTENANCE DATA

A. Six (6) bound Installation-Operation-Maintenance Manuals shall be furnished containing complete information relating to installation, operation, lubrication, adjustment, routine and special maintenance, repair, etc., including drawings, parts lists, handling weights, and performance data.

B. These manuals shall have a hard cover, appropriately marked and titled, and shall be printed on durable high quality paper. Poor reproduction of photographs will not be allowed.

C. The operation and maintenance manual and parts lists shall be bound separately and shall be approximately 8-1/2 inches by 11 inches. Drawings incorporated in the manual and/or parts lists may be reduced to page size provided they are clear and easily legible, or 11" x 17" sheets may be folded into the manual to page size. Photographs and/or catalog cuts of components may be included for identification.

D. The Contractor shall furnish to the Owner, prior to delivery, three (3) complete sets of operating and maintenance instructions and parts list for all equipment and systems furnished. Each set of information shall be bound in a three ring loose leaf binder and submitted through the Engineer.

1.10 QUALITY ASSURANCE

A. The Contractor shall keep the Owner and the Engineer informed as to commencement and progress of the work and of the progress of the pump fabrication. The manufacturer shall at all times permit the Owner's appointed inspectors access to all parts of mills, foundries, and yards or shops where work is being carried on under this contract and shall provide the necessary facilities and assistance for making thorough examinations. The acceptance of any material or finished member by an inspector

shall not prevent subsequent rejection if such material or member is later found to be defective or not in conformance with the specification requirements.

B. Should the manufacturer desire to use stock materials, not manufactured specifically for the work covered by these specifications, he shall submit evidence satisfactory to the Engineer that such material conforms to the requirements of the specifications, and if approved, detail tests of these materials will not be required. Tests, except where they are waived, shall be made as indicated in the respective detailed specifications or on the drawings. The manufacturer shall furnish certified reports in duplicate of chemical analyses and physical tests.

C. Non-Destructive Examination: The accessible areas of the impeller shall be subject to Liquid Penetrate testing to ensure a uniform and satisfactory casting. The pump shaft and couplings shall be Ultrasonic Tested for any non-conformities.

1.11 DELIVERY, STORAGE AND HANDLING

A. Pump bowl, diffuser and lower shaft shall be shipped completely assembled. The upper shaft, column pipe and flower pot may be shipped disassembled.

B. All pieces shall be shipped by flat-bed truck. Particular care shall be taken to prevent movement on the carrier's truck.

C. The pump, including its various parts, shall be protectively processed for not less than 12 months of storage outdoors at the destination. The Seller shall furnish, for approval by the Engineer and Owner, a complete description of the protective methods and instructions for their maintenance during the storage period.

D. Each piece of the pump shall be provided with appropriate fabricated eyes for handling or tapped holes for eye bolts. If eye bolts are not left in place after assembly, the holes shall be filled with stainless steel bolts.

1.12 COORDINATION

A. The Contractor shall coordinate the completeness and compatibility of the whole pumping unit including all connections between the driving train to the engine and the right angle gear, drive shafts and couplings, guards, pump and engine complete with all auxiliaries. The shop drawing submittals shall reflect such coordination and show all critical dimensions.

1.13 MATERIAL LISTS, TOOLS, AND SPARE PARTS

A. The Contractor shall furnish a shipping bill or memorandum of each shipment of finished pieces or members to the delivery point, giving the destination 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 the Owner and the Engineer at their respective offices.

B. Two sets of any special tools required to assemble or disassemble the pump or any component parts shall be furnished. If special tools or devices are necessary for

placement or removal of the impeller, other than threaded rod jacks, beam and plate washers all as are commonly available, they shall be furnished.

C. The following spare parts shall be furnished:

1. Two complete sets of bearing seals used on the pumps.

2. Spare set of o-rings for the stuffing box.

2.0 PRODUCTS

2.01 MATERIALS

A. The materials used shall be free from defects and imperfections, and of recent manufacture and unused, and of the classification and grades designated in the specifications or on the drawings.

B. All materials used under this contract shall conform to the following unless otherwise specified:

Cast Iron	ASTM A-48, Class 35
Ductile Iron	ASTM A-536, Grade 65-45-12 & Grade 60-45-12
Cast Steel	ASTM A-27, Grade 60-30
Forged Steel	ASTM A-336, Grade 80-55-6 or A668, CL D
Cold Rolled Steel	ASTM A-108 Std. Quality
Steel Shapes and Plates	ASTM A-36 or A-285 Grade B
Steel Shafting	ASTM A-668, Class F, Grade 1045
Corrosion Resisting Steel	ASTM A-276 Type 303 & 416
Stainless Steel Shafting	ASTM A-582, Type 416 or A276, Type 410
Cast Stainless Steel	ASTM A-743, CA6NM ASTM A-743, CF-3M
Bronze	ASTM B-584, Alloy 1-A
Leaded Tin Bronze	ASTM B-271, Alloy 938 "Copper-Base Alloy Centrifugal Castings"
Aluminum Bronze	ASTM B-148, Alloy C95500

C. Working stresses for structural steel, other than that used for pump parts, shall conform to the requirements of the A.I.S.C. Except for the pump shaft, rotating parts of the pump and other machinery, components subject to high stresses or shock shall be so designed that the maximum stress due to the most severe operating condition does not exceed two-thirds of the yield point. Where other parts of the pump assembly are subject to operating stresses, the unit stress in ferrous materials used shall not exceed the values in the following table. For the pump shaft, the combined torsional and bending stresses at any point shall not exceed eleven percent (11%) of the minimum yield point.

Material	Maximum Unit Stress in Pounds per Square Inch	
	Stress in Tension	Stress in Compression
Cast Iron	2,000	10,000
Cast Steel	10,000	10,000
Alloy Cast Steel Alloy Steel Rolled Shapes and Plates	20 percent of the Ultimate Strength or 33 Percent of the Yield Point	20 percent of the Ultimate Strength or 33 Percent of the Yield Point
Plate Steel, Where Utilized	12,000	12,000
	Stress in Torsion	Stress in Bending
Pump Shaft	11 percent of the yield point	11 percent of the yield point

D. Finishes:

Flanges	125 Microinch
Shafts	65 Microinch
Interference Fits	32 Microinch

E. The fit between pump components shall be in accordance with the following:

1. Shaft to shaft sleeve and to shaft coupling	Light press Fit 0.0015" nominal interference.
2. Shaft to impeller	Light Press Fit 0.0015" nominal interference.
3. Male and female fits for casing and column flanges, bowl flanges, shroud flanges.	Clearance, 0.0075" max., 0.0025" min.

4. Male and female fits for coupling flanges	Clearance, 0.002" max., 0.005" min.

The machining tolerance on the respective pieces that require "Light Press Fit" shall be such that the minimum interference is not less than 0.0005", and the maximum interference is not greater than 0.0025".

F. The fit between keys and keyways for both axial and circumferential type keys shall be in accordance with the following:

1. Key to keyway, side	Clearance (All Keys) 0.0015" min., 0.005" max.
2. Key to keyway, top and bottom	Clearance, 0.010" nominal

All keys and thrust rings within the pump shall be stainless steel.

2.02 CURVED STATIONARY VANES

A. Curved or warped surface vanes are required for the diffuser. These may be of formed steel plate, cast steel or ductile iron at the Contractor’s option. In any event, the welds at the junction of vanes with the outer shell, and at the junction with conical interior components, shall be continuous fillet welds of the size to match the minimum thickness of the plates used.

B. The thickness specified above shall be considered an average, as these vanes should be generally of a streamlined section, with tapered trailing edges.

2.03 IMPELLER BOWL

A. The impeller bowl, housing the propeller, shall be made of ASTM-A36 steel, fitted with a replaceable stainless steel bowl liner or wear rings for the full width sweep of the impeller blades and flanged for bolting onto the suction bell below and flanged for bolting onto the diffuser above. The wear ring shall be a minimum of 0.50" thick and shall be of ASTM A167 Type 316L or equal rolled stainless steel plate with full penetration longitudinal butt weld. The wear ring shall be machined all over, and the resulting radial clearance to the impeller shall be nominally 0.040" plus or minus a tolerance of 0.005". (The impeller clearance of the model shall not be less than the prototype clearance divided by the model ratio.) A lesser clearance will be allowed if the manufacturer's design requires the same. A greater clearance will not be considered.

B. As an alternative, the impeller bowl may be made of ASTM A-743 - Type CA-6NM or Grade CF-3 stainless steel. If this alternative is selected, the installation of stainless steel wear rings will not be required.

2.04 IMPELLER

A. The impeller shall be cast of ASTM A-743 - Type CA-6NM or Grade CF-3M stainless steel. The impeller shall be carefully cast to allow the vane surfaces to be fully machined to an ASA 125 finish to obtain precise geometric similarity with the model and to produce smooth vane and flow passage surfaces. The impeller vanes shall be designed to offer a well-rounded leading edge, and an appropriately streamlined cross-section tapering to a thin trailing edge. The leading edge shall have a radius of not less than 0.30".

The section of the vane near the hub shall be substantially thicker than the sections near the perimeter. In general, the propeller vanes shall be specifically designed to offer significant resistance to impact damage, particularly along the leading edge, as is occasioned by the trash and debris content of the drainage water being pumped.

B. The allowable tolerances from design values are as follows. Greater variation will result in rejection by the Engineer:

1. Pitch (each blade)	±1.5%
2. Rake (each blade)	±1.5%
3. Angular deviation between two consecutive blades	±2.0°
4. Blade outer diameter	Machined surface to achieve radial clearance of 0.040", ±0.005"
5. Blade thickness	+4%, -2%

C. All impeller vane and water passage surfaces shall be finished all over with the vane being fully machined to an ASA 125 finish. Other water passages are to be hand finished using appropriate grinders and disk sanders, to obtain finished surfaces which are smooth and free of casting imperfections. These surfaces shall, in general, be equivalent to an ASA 125 finish.

D. The impeller shall be dynamically balanced through its full speed range up to and including 125% design speed using two-plane balancing methods in an appropriate balancing machine, with the impeller supported upon a mandrel. The impeller shall be balanced to ISO Grade G2.5. Weight removal from the vane surfaces will not be allowed.

E. Weight removal from the flow passage surfaces of the hub will be allowed only if the removal area is carefully blended into the adjoining areas so that a discontinuity cannot be perceived. In general, weight removal shall be restricted to those areas of the impeller where the removal will not impair hydraulic performance. Weight addition will be allowed only if the balancing weight is securely attached, preferably by welding. The Seller shall furnish the pump manufacturer's calculations insuring that the pump operating speed is a minimum of 20% below the critical speed.

F. The impeller shall be bored and key seated for a straight shaft fit. The finish of the impeller bore shall be ASA 63 or better. The impeller to shaft fit shall be a light press fit requiring approximately 5 tons of axial force for placement. The axial position of the impeller on the shaft shall be maintained with a split stainless steel thrust collar, retained by a thrust plate and cap screws.

G. Minor external surface imperfections of the impeller may be welded up and/or ground down as necessary to preserve the correct contour and outline of the propeller and restore the surface imperfections to the same degree of finish as the adjacent surrounding surfaces. Surface pits, depressions, projections or overlaps showing greater than 1/8" variation from the general contour for the section shall be corrected as outlined above. Castings which exhibit surface imperfections as defined above covering an area of more than 10 percent of any one surface of any blade will be rejected. All repairs and the methods used shall be approved by the Engineer before proceeding with the repairs.

2.05 STUFFING BOX

An Inpro Labyrinth seal shall be installed on top of the shaft enclosing tube below the pump/gear base plate. The stuffing box shall contain all o-rings required to isolate the enclosing tube from the discharge area.

2.06 BOWL BEARING AND BOWL BEARING HOUSING

A. The bowl bearing assembly shall consist of a bronze sleeve bearing enclosed within a steel, or cast iron, bearing housing with cylindrical external fits for containment within the cylindrical bore at the bottom of the diffuser. A flange shall be provided at the top of housing for attaching the housing to the flange of the lower enclosing tube or to a machined surface at the top of the diffuser. Bearing construction shall allow for easy removal of the bearing for inspection and replacement.

2.07 PUMP SHAFT

A. The entire pump shaft shall be solid ASTM A-585 Type S416 or ASTM A 276 Type 410 Stainless Steel, or approved equal. Minimum shaft diameter shall be 11”. The shaft shall be supported by no less than two (2) bearings, one (1) bearing above the impeller and one (1) immediately above the diffuser section.

B. The shaft shall be machined all over between centers and finished to a surface roughness of at least ASA 63; with surface roughness not exceeding ASA 32 at the ground and polished finishes required for the sleeve, coupling, impeller and bearing areas. The total indicated runout shall not be greater than 0.005" for clear span portions of the shaft, and not greater than 0.001" at bearing journals and at the impeller and sleeve fit areas.

C. The propeller shaft shall be fitted with renewable shaft sleeves appropriately fastened at all internal bearing location. The shaft sleeves shall be turned, bored and completely finished of NCB Type 300 series stainless steel or hardened Type 400 series stainless steel of uniform bore with a 0.0015" to 0.0025" full length interference fit. Minimum sleeve wall thickness shall be 0.375". The total indicated run-out of the sleeves, when mounted on the shaft shall be less than 0.001".

D. The use of seamless tubing which has not been specifically bored and turned for fit upon the shaft will not be allowed.

E. To facilitate field assembly of the impeller on the shaft and field placement of upper coupling, drilled and tapped holes shall be provided in the ends of the shaft sections. Means shall also be provided for temporarily supporting the pump shaft and impeller during assembly and disassembly.

2.08 DIFFUSER CASING

A. The diffuser casing shall be cast ductile iron conforming to ASTM A-536 GR 65-45-12. Cast Iron will not be allowed. The diffuser shall be flanged on each end for bolting to the impeller casing and discharge elbow. Flanges shall be machine finished for male and female register fit. Dimensions shall meet the space requirements as shown on the drawings.

B. Appropriate stationary curved vanes (see subparagraph 2.02) shall be provided in the diffuser casing to receive the vortex flow leaving the impeller and turn this flow into an axial direction. These vanes shall connect to an internal conical piece which shall contain the fits for the bowl bearing assembly. The axial distance or clearance between the trailing edges of the impeller vanes, and the leading edges at the diffuser vanes shall not be less than 5 inches at any position. Alternative designs which offer greater clearances than these, but at slight loss of efficiency, will be considered.

2.09 FSI SUCTION CONNECTION

A. The flower pot pump design shall be installed with the upper portion of the diffuser housing flange stabilized by the existing guide ring mounted below the elevation 5.25 discharge weir slab.

B The pump connection from the impeller bowl to the concrete FSI shall accomplished through an existing 316 stainless steel support ring anchored into the upper portion of the FSI outlet. The pump manufacturer shall review the existing ring to verify dimensions and match their pump to the existing field conditions. This existing ring allows up to 2 inches of pump vertical movement capability and shall have all provisions for pump alignment and anti-rotational support.

C. The FSI suction connection shall allow the entire impeller housing, impeller, diffuser and diffuser vanes to be removed without the need to place a diver into the station intake and without the need to remove fasteners attaching the impeller bowl to the FSI.

D The suction shall be ribbed where necessary for strength and rigidity. All bolts and nuts used shall be corrosion-resisting steel.

2.10 BASE PLATE

A. The pump shall have an ASTM A36 square steel base plate, with I-beam stiffeners, if required, designed to fully support the pump over the opening in the concrete deck at approximate elevation 12.25, all as shown on the drawings. Base plate thickness shall be not less than 3.75" after machining and its size shall be determined by the pump manufacturer subject to the drawing requirements. The base plate and other pump components shall be designed to support the weight of the pump and reducer gear as

well as the other dynamic and static loads which will occur during operation. Full consideration shall also be given to the stresses caused by transportation and erection.

B. The underside of the pump base plate shall be machined to an ASA 125 finish on its bottom contact surface to provide a true and flat surface for mounting on the sole plate. When the pump base plate is level, the axis of the pump shaft shall not vary more than 0.0015" per foot from a plumb line.

C. The pump base plate material shall be 4" minimum thickness steel plate and shall have a minimum of 40 holes for the 1.5" min. dia. hold down studs and nuts. The base plate shall also have a minimum of 20 threaded holes for the 1 ¼” jacking bolts.

2.11 SOLE PLATE

A. The sole plates on which the pump base plate is mounted, shall be four (4) separate pieces, and each shall be machined on top to a true and flat bearing surface for the pump base. The sole plates shall be anchored to the concrete with an appropriate number (20 min. - 1.75" min. dia.) of anchor bolts located externally from the pump base plate. Appropriate provisions shall be made for bolting the pump base to the sole plate.

B. The sole plate shall be drilled and tapped for the pump base plate bolts, and drilled for the anchor bolts anchoring the unit to the concrete pump support. Twelve (12) leveling bolts in tapped holes shall also be provided. The sole plate shall have its top surface machined to an ASA #125 finish surface and shall be provided with shear lugs on the underside. The sole plate shall be not less than 1.25” thick and 5” wide after machining and shall be constructed of ASTM A-36 steel.

C. One of the four (4) sole plate segments (in line with flow) shall be provided with four (4) shear lugs or keys on the underside. These shear keys shall be 1" x 1.5" x 10" long minimum. Early shipment of the sole plates and anchor bolts will be required to facilitate station construction. Anchor bolts shall be drilled epoxy anchors and will be provided by the Installation Contractor. Pump manufacturer shall coordinate placement of anchors with the Installation Contractor during installation.

2.12 PUMP TO REDUCER GEAR COUPLING

A. The pump shaft shall be connected to the gear shaft with a rigid flanged, rabbet fit, coupling incorporating adjustment features. This coupling shall including split thrust collars and other necessary provisions for transfer of thrust from the pump shaft to the thrust bearing within the gear.

B. Male and female fits shall be provided on all flange faces. The spacer length shall be adequate to allow replacement of the pump elbow bearing element without removal of the gear. This coupling shall be forged steel ASTM-A-668-Class-D. A rigid flanged coupling, without spacer, may be used if the downward movement of the impeller is not restricted by vanes in the suction or the configuration of the pump bowl.

C. A thrust bearing to carry the maximum total thrust load shall be provided on the shaft of the gear reducer.

2.13 DISCHARGE COLUMN

A. It is not intended that a discharge column is placed above the diffuser section of the pump, but if one is required it shall adhere to the following details. A flanged discharge column fabricated from steel plate weldments with a minimum finished thickness of three-quarter inches (3/4") shall be provided. Mating flanges shall have not less than four (4) tapered dowels or fitted bolts. The column shall be designed to safely and satisfactorily withstand all stresses due to installation and operating of the pump. All bolts and nuts used shall be corrosion resisting steel.

2.14 BOWL COUPLING, COUPLING HOUSING

A. If the pump manufacturer elects to fabricate the pump shaft in two pieces, the coupling shall be suitable for transmitting the rotating element weight and hydraulic thrust. Couplings shall be capable of transmitting torque in either direction. The coupling shall be located directly above the pump bowl bearing and shall be enclosed within a bearing housing.

2.15 INTERMEDIATE BEARING, INTERMEDIATE BEARING HOUSING

A. The intermediate shaft bearing shall be a bronze sleeve type bearing identical to the bowl bearing. The bearing housing shall be similar to the bowl bearing housing. The intermediate bearing housing may be integral with the lower bearing housing.

2.16 BRONZE SLEEVE TYPE BEARINGS

A. All pump internal bearings shall be of the bronze sleeve type, grease lubricated designed in such a manner as to allow easy removal, inspection and replacement. The length of the bronze sleeve type bearings shall be approximately 1.25 times the bearing I.D.

B. Bearings shall be automatically grease lubricated from the operating floor. Grease lines shall be type 304 stainless steel and shall be adequately supported and protected from possible mechanical damage. Grease lines external to the pump shell shall be heavy wall stainless steel tubing and shall be protected by an epoxy coated steel channel with a size and thickness acceptable to the Engineer and securely attached to the pump with stainless steel bolts and nuts. The grease lines from the pump base plate to the bearings shall be schedule 80 stainless steel pipe. Grease lines attached to the pump shall terminate at the upper side of the steel base plate and shall be plugged or capped with brass fittings during shipment. Lubrication lines shall be run individually to each bearing. Lines shall be supported along the enclosing tube not more than three feet (3'-0") apart. Lubrication line guards shall be provided.

C. Provide the pump with its own individual electric motor-driven centralized pressure lubrication system, designed to deliver the proper predetermined or metered quantity of lubricant to each individual bearing. It shall positively indicate proper or improper functioning of any individual metering device. Mount pressure pump, individual metering devices, and any required auxiliary operating accessories suitably on

baseplate. System shall be furnished complete and ready for operation, including sufficient lubricant to fill each pressure pump lubricant reservoir. Submit complete centralized pressure lubrication system to Engineer for review and approval. Furnish lubricant recommended by pump manufacturer, subject to approval of Engineer.

Provide Electric motor-driven central pumping unit as a complete assembly, consisting of positive displacement type pump, flow-directing valve, lubricant reservoir, suitable pressure gage to indicate pump discharge pressure, operation counter, pressure protective device, and other auxiliary accessories as required to give a complete and workable unit conforming to requirements specified. Pump shall be of multiple individual piston, positive displacement type utilizing hardened steel pistons closely fitted to cylinder bores to eliminate the need for packing, and spring-actuated check valves shall not be required for its operation. Pump shall deliver not less than 6 cu inches of lubricant per minute against a pressure of not less than 2,000 psi measured at the most remote bearing connection. Lubricant reservoir shall be of suitable metallic construction, shall have a capacity of not less than24 pounds of lubricant, shall be provided with suitable means that will ensure positive priming of pump at all times (such as an atmospheric or spring-loaded follower plate), an indicator to show quantity of lubricant in reservoir, and a screened fill connection to permit filling reservoir by transfer pump without exposing lubricant to atmosphere. Provide pump unit with a fully automatic control system, capable of suitable or proper scheduling by an adjustable synchronous motor-driven timing device, and other required auxiliaries necessary to give a complete and workable system. Provide controller with a "Hand Off-Automatic" selector master switch to permit selection between push button manual and automatic time clock operation, and to de-energize the system. Electric power will be supplied at 115 volts single phase, 60 cycles. Use time clock setting recommended by main pump manufacturer.
The lubricating system shall be Farval Dual Line, or approved equal.

Provide metering or measuring valve for each bearing and stuffing box. It shall be fully hydraulic in its operation, requiring no internal springs or check valves. All valve sizes to be determined by the pump manufacturer.

D. All bearings above the pump bowl shall be protected by a 5/8" minimum thickness steel shaft enclosing tube. Since the drainage water may contain some fine sand and/or silt in suspension, special provisions shall be made in the design and construction to preclude the entrance of water, sand or silt between the bearing and journal due to differential water pressure between the ends of the bearing. Special attention shall be given to the design and selection of materials for all parts, especially to the seal rings or packing rings at the end of the bearing. The bearing liner shall be arranged for maximum distribution of the grease for lubrication of the journal surface, and to prevent the entrance of water sand, silt or other foreign material.

E. The bronze bearing sleeve shall be provided with keepers which will lock the bearing within the housing. The housing shall have internal rims at each end to prevent axial movement of the internal shell or bearing housing. If the design incorporates an internal shoulder add a lock bolt to prevent axial movement of the bearing.

F. The maximum O.D. of the bearing shell shall not exceed the minimum bore of the housing. The difference between the minimum O.D. of the bearing shell and the

maximum bore of the split housing shall not exceed 0.003". All shells shall be effectively secured in place to prevent turning by coating the mating surfaces with "Loctite" compound at assembly or by other approved methods.

2.17 SHAFT HOUSING

A. The entire pump shaft from the pump bowl bearing to the bottom I-beam stiffener assembly below the pump base plate shall be enclosed within a steel flanged housing. The lower flange shall connect to the bowl bearing housing and the upper flange shall connect to the mounting plate box assembly.

2.18 FASTENERS AND CONNECTIONS

A. All pump fasteners, bolts, nuts, dowel pins, etc. which are used to assemble or align the various components and casings used in the pump construction shall be stainless steel as specified herein.

B. Bolts and pins shall be Grade B8M, Type AISI 316, Stainless Steel in accordance with ASTM A-193. Nuts shall conform to ASTM A-194, Grade 8M, AISI Type 316. Threads shall be UNC type with a Class 2 fit and bolt heads shall be hex shaped unless otherwise noted.

C. Holes for unfinished bolts less than 3/4" in diameter shall be 1/16" larger than the bolts and for unfinished bolts 3/4" and larger shall be 1/8" larger than the nominal diameter of the bolts.

D. Flat washers shall be the heavy type 316 Stainless Steel in accordance with ANSI B18-22.1. Lock washers shall be heavy series conforming to ANSI B18-21.1.

E. Holes for turned bolts shall be not more than 0.020 inch larger than the nominal diameter of the bolt. Poor matching of holes shall be cause for rejection. Foundation bolt holes shall be not more than 1/4 inch larger than the nominal diameter of the bolt.

F. Turned bolts shall have a tolerance of plus 0.0006 inch and minus 0.0006 inch on the nominal diameter. All bolts, nuts, studs and other fastenings inside pump and subject to corrosion shall be Type 316 stainless steel. All bolts on the flanges and on the exterior of pump below Elevation 2.00 shall be stainless steel, hex head with stainless hex nuts as specified above.

G. Washers shall be used on non machined surfaces and on surfaces that are not spot faced.

H. When bolts and nuts are used, the bolt shall be long enough so that at least two threads show outside of the nut.

2.19 FLANGES

A. All steel flanges shall be minimum 125# complying with ANSI B-16.1 standards of thickness mentioned herein and shall be welded to the pipe or casing sections with fillet welds of a maximum size as determined by the plate sizes. Seal welds shall be used on the inside of all fillet flange welds in accordance with AWWA C200 and C206.

B. Steel hub or ring flanges shall be minimum 1.500" thick, and cast iron flanges shall be a minimum thickness of 2.000" measured at the thinnest point.

C. Surfaces of finished flanges shall be true and straight within five thousandths of an inch (0.005"). The faces shall have a smooth finish, ASA 125 or better, suitable for a metal to metal joint using only a sealing compound. The back faces of the flanges shall be full or spot faced.

D. The bowl connecting flange (or flanges if the impeller casing is a separate piece) must be provided with indexing male and female fits
Any bidder requesting consideration of said above alternative shall submit with his bid, notification of the planned alternative, and shall provide immediately after the bid, details and descriptive material as will allow the Engineer to judge the adequacy of the offering prior to award.

E. Split flanges, casing flanges and other miscellaneous mating surfaces which are not provided with male and female register fits shall be indexed to each other with tapered dowels which have been fitted into appropriately reamed holes. The dowel pins shall be provided with a threaded portion on the large end and a hex nut for extraction.

2.20 WELDING

A. All welding shall conform to the American Welding Society (AWS) requirements for pump structural members and supports, and to ANSI B31.1 for pump casing, branch connections and flanges. Pressure containing welds shall be full penetration type and watertight. All welders shall be qualified per applicable A.W.S. requirements or Section IX of the ASME Boiler and Pressure Vessel Code. All welds shall be continuous. Field welds and tack welds will not be allowed. Where the manufacturer believes materials other than those specified will yield superior welded joints, he shall recommend those materials in writing, with their advantages, for the Engineer's consideration. The Engineer shall be notified as to the exact welding procedures to be used.

B. All steel weldments shall be appropriately stress relieved prior to machining operations. Mechanical peening of each individual weld pass or annealing of the entire weldment, or both, may be used. Welding procedures, welding rods, etc., shall be selected to minimize residual weld stresses. The Engineer shall be notified of the stress relieving procedures to be used.

C. Welds to join pipe segments shall be full penetration butt welds in accordance with AWS D1.1 with a seal bead along the inside or back of the completed weld. The

engineer reserves the right to verify complete penetration by radiographic or other methods.

D. All fillet welds shall be subject to inspection by the dry powder magnetic particle inspection method.

2.21 CASINGS, CASTINGS AND FORGINGS

A. All casings of the various components shall be of steel plate, rolled and fabricated by welding techniques into the final components. Plate thickness for pressure casings which are not bored shall not be less than 3/4".

B. Each casting shall have the mark number cast upon it. Each casting shall have the heat number stamped or cast upon it. Each forging shall have the mark number stamped upon it.

C. Castings: Repairs to castings shall not be made without prior approved procedures. Warped or otherwise distorted castings or castings that are oversized to such an extent as will interfere with proper fit with other parts of the machinery will be rejected. The structure of the metal in the castings shall be homogeneous and free from excessive non-metallic inclusions.

D. 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. All patterns shall remain the property of the manufacturer.

2.22 MACHINE WORK

A. General: All tolerances and allowances shall conform to ANSI B4.1, "Preferred Limits and Fits for Cylindrical Parts." Tolerances for machine-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 of 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. All like parts shall be interchangeable. All drilled holes for bolts shall be accurately located.

B. Finished Surfaces: Surfaces to be machine-finished shall be indicated on the shop drawings by symbols which conform to ANSI B46.1, "Surface Texture". Finishes shall be ASA #125 or better on flange faces, ASA #65 on shafts, ASA #125 on general machine work and ASA #32 on bearing journals at anti-friction bearings. Flaws such as scratches, ridges, holes, peaks, cracks or checks, which will make the part unsuitable, will be cause for rejection.

C. Unfinished Surfaces: Unfinished surfaces shall be true to the lines and dimensions 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 may be filled in a manner approved by the Engineer.

D. Shafting: Shafting of non-uniform diameter shall be made of hot-rolled steel, shall have fillets where changes in section occur, and shall be ground and polished. Plain shafting may be made of cold-finished steel unless specified otherwise.

2.23 FINISHES

A. All surfaces of the pump which are to be coated with coal tar epoxy or painted shall be prepared for coating by removing all dirt, grease, loose scale and foreign matter as specified for commercial sandblasting in conformance with SSPC-SP6-63 of the Steel Structures Painting Council. Machined surfaces shall be suitably protected during blasting. After blasting, the surfaces shall be cleaned of all dust and immediately given an initial coating in accordance with the coating manufacturer's recommendation.

B. All pump exterior surfaces below the base plate and all interior surfaces, except for machined surfaces, shall be given two coats of black "high build" coal tar epoxy, "Rustoleum" No. 9578 or approved equal. Application shall be made with airless spray equipment. Coating total dry film thickness shall be not less than 14 mils (7 mils per coat).

C. All pump exterior surfaces above the sole plate shall be primed with Rustoleum No. 1069 red primer to a minimum dry film thickness of 2 mils, and given one finish coat of Rustoleum No. 906 "Silver Gray". The assembly match marks shall not be obscured. After installation, the erection Seller will touch up match mark locations and apply a second full finish coat of "Silver Gray" paint to the pump exterior.

2.24 PROTECTION OF THE SURFACES

A. All machined surfaces shall be cleaned with solvents and then protected with a dipped or brush coat of “Wechem Rustram Rust Preventative Coating”, or “Humble Rust Ban 324” which are amorphous waxes containing rust inhibitives. It is necessary to melth the coating before application to an appropriate temperature of 160 degrees F. After application, the surface of the coating shall be blended into a smooth surface by passing a blowtorch flames over the coating.

B. All machined or contact or running surfaces, bearings, journals and other such parts shall be protected with approved corrosion inhibiting preservatives and shall be completely protected from sand, sand blast and painting damage as well as atmospheric corrosion. These surfaces shall be protected and treated in accordance with the manufacturer’s standard practice for extended storage of approximately 12 months.

3.0 <u>EXECUTION</u>

3.01 PREPARATION (SHOP ASSEMBLY)

A. Before shipment, each pump shall be completely shop assembled in order to determine and remedy any misfits or errors in the manufacture of the various components. Before assembly, the Engineer may elect to check all fits and finishes, at one location and time for all pumps. Any errors of misfits discovered shall be immediately corrected. If there is a size problem in shipping the pump assembled, the

Engineer may permit disassembly after inspection for shipment, otherwise, the pumps shall be shipped assembled. If register fits are not used, dowel pins shall be installed at this time. Before disassembly for shipment, the pump components shall be match marked with stenciled letters to aid in field assembly. The vertical alignment of the pump shaft shall be checked and verified using laser alignment or dial indicator method.

At least 10 days notice shall be given to the Engineer and Owner in advance of bowl assembly. The Engineer and/or Owner or their representatives will witness the assembly of the pump bowl. Travel and incidental expenses incurred shall be paid by the pump supplier through the Contractor.

3.02 INSTALLATION

A. The pump will be installed in the space provided in the pumping station as shown on the contract drawings. The pump manufacturer shall furnish all sole plates, and structural and plate steel necessary to support the pump, the drive gear reducer, and all accessories to ensure vibration and movement are within Hydraulic Institute and pump manufacturer's standards. Pump manufacturer shall furnish templates describing bolt locations required for anchoring sole plates and structural members.

B. Prior to the start of installation, extensive and accurate measurements of the pump area shall be made by the Seller to verify conditions shown on the Drawings and to provide for proper installation of the pumps. Seller shall set centerlines and benchmarks, locate and set anchor bolts, pour concrete foundations, determine and set elevations for setting of sole plates, all as checked by the Engineer prior to start of work. The erection of the vertical pump shall proceed prior to the erection of all other related machinery. The following paragraphs describe the work of erecting the pumps.

C. The vertical pump is shipped assembled less the gear. It is intended that the pump be installed assembled. Sections of the pump are match marked and doweled at the factory. All parts shall be carefully cleaned before assembly. Painting shall be completed before assembly.

D. The four (4) pump support plates (sole plates) shall be installed by the Seller over the anchor bolts and leveled using leveling screws and steel shim stacks. At least one 11" minimum length shim stack shall be on each side of each anchor bolt. Any shim less than 1/8" thick shall be stainless steel. The sole plate with the four (4) shear keys shall be installed on the soleplate in line with the intake flow and on the intake side of the pump.

E. The design of the vertical pumping unit requires that the pump support plates be installed perfectly level resulting in a true, vertical, plumb shaft to within 0.001" with horizontal surfaces to within 0.001" per foot measured at four (4) points. The pump rotating assembly is designed to be supported by the right angle gear. During assembly and disassembly, the rotor only may be supported at the FSI support ring.

F. After the sole plates are leveled to the above specifications at the elevation shown on the contract drawings, the sole plate anchor bolts will be tightened to one half final torque value. Grouting under the sole plates will take place at a later time. After the

bolts are tightened, the level of the sole plates shall be checked to verify level in accordance with the preceding specifications.

G. Once the sole plates are leveled, the pumps shall be lowered into the FSI connector and onto the sole plates. The pump base plate shall be bolted to the sole plates using the pump hold down studs and nuts. The entire unit shall then be leveled. The Seller shall insure that the shaft assembly is true and plumb by use of tight wire, or other methods, and that shaft clearances are equalized at the lower bearing housing, the stuffing box, and the upper bearing housing. Vertical alignment of the pump shaft shall be within 0.001" per foot.

H. Contractor shall field position the gear upon the ring base as shown on the drawings. The reduction gear shall be installed and the end gap between coupling halves shall be so adjusted to provide proper positioning of the pump impeller. Maintaining all clearances equal and the shaft plumb, the Contractor shall dial indicate or laser align the gear coupling half to the shaft coupling half, shimming and shifting the gear base as required to bring the pump shaft and gear shaft into alignment. Level gear with pump so that gear to pump coupling faces are parallel within 0.001". Gear shaft and gear half coupling T.I.R. shall be 0.001" maximum.

I. Upon completion of the installation of the gear and tentative approval of the pump alignment, the Contractor, at a later date when directed by the Owner, shall grout in the pump using non-shrink grout to provide full bearing on the supporting concrete foundation. Vertical positioning of the pump impeller shall be adjusted to the satisfaction of the Owner and Engineer.

J. At a later date, when directed by the Owner, the void under the sole plate will be filled with a non-shrink grout by the Contractor to provide full bearing on the supporting concrete foundation.

3.03 FIELD QUALITY CONTROL

A. The Contractor under this contract, shall furnish a field engineer working for the pump manufacturer and such other personnel as may be required for observation of erection and installation for up to thirty (days) in up to six (6) trips as follows:

1. Verify existing components are within installation specified and manufacturer tolerances.

2. Verify pump, gear and engine installations are within specified and manufacturer tolerances.

3. Supervise installation as necessary.

4. Supervise 2-hour demonstration run.

5. Supervise 1-hour operating test.

3.04 DEMONSTRATION

A. When the pumps have been installed, an operating test of the pump, engine and gears, together with auxiliaries, shall be performed by the Contractor, under the supervision of the pump manufacturer, for a continuous period of at least one (1) hour. The Contractor shall be responsible for the performance of all drainage pumping equipment and auxiliaries supplied by him and shall have a qualified representative on the job site during preparation for operation, adjustment and tests. The tests shall be conducted after the pump and other mechanical equipment have been installed, cleaned, flushed, lubricated, adjusted, calibrated, and operated for sufficient periods of time to make all necessary adjustments. All necessary lubricants, fuel, and electric power required to conduct tests will be supplied by the Seller. All tests shall be witnessed by the Engineer.

The cost of the pump manufacturers' field engineer and such other personnel required for supervision of erection, installation and operating tests shall be included in the bid.

B. Field engineering services are required of the pump, engine, and gear manufacturers.

C. Prior to the installation of the pumping unit, the Pump manufacturer, shall using a Faro Laser Tracker or equal portable coordinate measuring machine, check existing pump support ring and FSI soleplate installation. Pump manufacturer shall also verify true center and levelness of soleplates and pump support ring. All recorded measurements shall be within specified and manufacturer’s tolerances. A report shall be submitted and approved prior to final payment.

D. The services of the pump manufacturer’s field engineer will be requested in writing by the Seller at least two (2) weeks prior to the time the services are required.

E. The thirty (30) day service time will be utilized in six (6) five consecutive day periods, Monday through Friday. The six (6) five day periods may not necessarily run consecutively. The working hours shall be as determined by the Seller but shall not exceed eight (8) hours per day.

F. An operating test of the pump, engine and gear together with all auxiliaries shall be run, by the Contractor, under supervision of the pump manufacturer's field engineer for a continuous period of at least one (1) hour. The Contractor shall be responsible for the performance of all equipment and auxiliaries supplied and shall have a qualified representative from the pump manufacturer on the job site during preparation for operation, adjustment and tests. The tests shall be conducted after the pump and other mechanical equipment have been installed, cleaned, flushed, lubricated and operated for sufficient periods of time to make all necessary adjustments. All necessary power, fuel, and lubricants required to conduct tests will be supplied by the Contractor. All tests shall be witnessed by the Engineer or his designated agent.

G. Upon the conclusion of his work, the pump manufacturer's field engineer shall provide written certification that the vertical pump was received in good condition, was handled, installed, and tested in accordance with the manufacturer's

recommendations, and that this equipment satisfactorily performed in accordance with the intent of these Plans and Specifications.

H. Any leaks or malfunctions discovered during the conduct of these tests shall be corrected by the Contractor and retests conducted. Each pumping unit shall be checked visually and aurally for vibration, unusual noise and general operation by the erecting engineer.

END OF SECTION

SECTION 20 10 01

DRAINAGE PUMPS - PUMP MODEL TEST

1.0 GENERAL

1.01 WORK INCLUDED

A. The work provided for herein consists of hydraulic testing of a scale model of the proposed 1,076 CFS drainage pump and sump. The test shall be performed by the pump manufacturer in accordance with the requirements specified below.

B. The model test shall verify the following conditions:

1. The pump performance equals or exceeds the conditions specified in Section 22 10 00. Paragraph 1.04 A, or the performance characteristics submitted with the Contractors bid, whichever is greater.
2. The pump is compatible with the sump configuration shown on the drawings and operates at the specified conditions without noise, vibration, cavitation, air entrainment or vortex activity.

C. Unless a model test for the exact geometry and operation conditions has been previously conducted and witnessed, within 150 days after award of the Contract, a model test of the proposed pump as specified below and witnessed by the Engineer shall have been successfully completed. Failure of successfully completing all portions of this model test within the specified time period shall be grounds for placing the Contractor in default as defined in the General and Special Provisions of the contract.

D. The model test shall be successfully completed and have the Engineer's stamp "REVIEWED" or "REVIEWED AS NOTED" on the "Model Test Report" prior to proceeding with manufacturing of the pump. This report shall be submitted to the Engineer for review within fifteen (15) days after completion of the test. Any manufacturing prior to receiving this stamp will be at the Contractor and/or manufacturer's own risk.

E. Prior to performing the model test, the "Model Test Set-Up and Procedures" shall have been submitted and received the Engineer's stamp "REVIEWED" or "REVIEWED AS NOTED" on this submittal.

F. The entire model test shall be witnessed by the Engineer and/or his designated representative. At least 15 days written notice shall be given to the Engineer in advance of the model test, which shall be scheduled for a mutually agreeable date. Travel and incidental expenses incurred by the Engineer and/or his representative for witnessing the model test shall be borne by the Owner. However, expenses incurred due to testing beyond 5 days or additional trips for re-testing will be borne by the Contractor.

G. The cost of fabrication of the model and running the test by the pump manufacturer shall be borne by the Contractor.

H. The performance model test procedures, except as otherwise herein specified shall be in complete accordance with the Centrifugal Pumps Test Code of the Hydraulic Institute Standards. Three separate series of tests shall be conducted with a model test configuration similar to that shown on Fig. 49B of the above Standards and further described herein. Where conflicts exist, this specification shall govern.

1.02 SUBMITTALS

A. Model Test Data - Submittal with Bid

The following information about the Model Test Facilities shall be furnished within 5 days after the bid opening:

1. In lieu of performing a model test, submission of a prior model test report for this station and specified design criteria will be allowed.

2. Name and location of organization that will perform the model testing, including a description of the organization's capabilities to perform the test in accordance with the specifications.

3. Sketch of the proposed test set-up and brief description of the test components and instruments.

4. Proposed model ratio to be used.

5. Minimum suction absolute pressure (maximum negative pressure due to vacuum plus head of water), measured at the center line of the impeller, which the suction tank can sustain on a continuous basis during cavitation testing and method of holding this pressure steady during each test.

6. System loss calculations.

7. Table of expected performance including flows, bowl total head and bowl efficiency. Calculations shall include all losses from the FSI through the discharge weir using the flows indicated in Section 22 10 00.

B. Model Test Set-Up and Procedures - Submittal

Unless a model test for the exact geometry and operation conditions has been previously conducted and witnessed, prior to performing the model test, details of the proposed test set-up and test procedures shall be submitted for the Engineer's review. Detailed information to be provided with this submittal shall include the following:

1. Dimensional drawings and cross-sectional views of the test set-up including suction tank, pump stand, and return piping. All pertinent dimensions and elevations shall be shown including the location of all instruments and the point of their connection to the model. The drawings shall identify the model to prototype ratio and sufficient dimensions shall be given for the Engineer to verify exact similitude.

2. Dimensional drawing of the model impeller showing design values and tolerances on the blade pitch, outer diameter, blade thickness, and blade-to-blade angularity. Where this information is considered proprietary, it shall be available for the Engineer's inspection prior to model testing.

3. Formed Suction Inlet (FSI) dimensions as per U.S. Army Corp of Engineers report EM 1110-2-3105, Type 10 FSI based on the impeller bowl throat diameter of the prototype pump being offered and the model dimensions for this test.

4. Table of expected performance including flows, bowl total head and bowl efficiency. Calculations shall include all losses from the FSI through the discharge weir using the flows indicated in Section 22 10 00.

5. Sample calculations of model test results corrected to prototype scale for speed, flow, efficiency, horsepower and NPSH.

6. Detailed description of all instruments to be used including manufacturer, model, type, calibration certificates, certified accuracy, scale reading, conversion factors, and sketch of each manometer used showing location of tie-in to the model and point of zero reference.

C. Final Model Test Report - Submittal

Unless a model test for the exact geometry and operation conditions has been previously conducted and witnessed, after performing the model test and making dimensional measurements of the model impeller, and obtaining signatures of the witnessing engineer on test data record sheets, the Contractor shall submit a model test report consisting of the following:

1. Dimensional drawings and cross-sectional views of the as-run test set-up.

2. Certified dimensional drawing of the model impeller and related tolerances, as-measured.

3. Summary of test results.

4. Guarantee that the prototype pump will meet all specified operating conditions without vibration or cavitation.

5. Certified performance curves for the model showing total head (TDH), brake horsepower, efficiency and NPSHR as ordinates with flow rate in gpm as abscissa. Pool-to-Weir head vs. the flow rate shall also be shown.

7. Certified performance curves for the prototype showing total head (TDH), brake horsepower, efficiency and NPSHR as ordinates with flow rate in gpm as abscissa. Pool-to-Weir head vs. the flow rate shall also be shown.

8. Curves showing the results of the cavitation tests. Efficiency, brake horsepower and total head (TDH) as ordinates; all plotted against sigma as the abscissa.

NPSH may be used in lieu of sigma. The relation of plant sigma to the respective critical sigma shall be shown on the curve.

9. Certified system loss curve at capacities specified.

10. Sample calculation for each type of model and prototype data calculated from recorded test data.

11. Submergence requirements as measured over the pump impeller centerline for all specified flow points.

12. Copies of all test data recorded with the witnessing engineer's initials on all record sheets.

2.0 PRODUCTS

2.01 MODELING EQUIPMENT ASSEMBLY

A. The model set-up shall be an exact geometric similitude of the prototype pump from suction pool to pump discharge, including the suction bay from the inside face of the trash rack through the formed suction intake and the pump.

B. The model shall be a closed system with suction tank and have clear windows or ports and adequate lighting in the suction bay and at the pump intake to allow visual determination of the suction conditions during each test. The model shall also contain provisions for dye injection and the observation thereof, at various critical locations to determine suction flow patterns. The dye shall be non-miscible with water and shall not discolor the water during testing. The water used during testing shall be clear at all times, free of debris and bubbles to allow proper observation of flow patterns. At no time during testing shall the water temperature exceed 80 degrees Fahrenheit.

C. The model drive shall be capable of variable speed to allow test runs at reduced speeds that yield froude similitude. The drive shall be a true dynamometer capable of instantaneously allowing direct measurement of torque and speed. The torque shall be measured by strain gages mounted on a rotating "torque shaft" and witness calibrated, or by cradle mounting of the dynamometer. The use of a "calibrated motor" WILL NOT be allowed.

D. The model pump speed shall be determined by a magnetic pulse type device with the frequency of the pulses continuously compared to standard 60 hertz power. The use of a voltage type tachometer-generator for speed determination WILL NOT be allowed.

E. Pump flow shall be measured by a calibrated venturi flow meter.

F. Head and vacuum measurement shall be made using a direct reading water column, mercury-air, mercury-water or fluid manometer.

G. The efficiency of the prototype pump shall be considered to be the efficiency of the model pumps as determined by the witnessed tests. No other computation or upward adjustment of model efficiency to prototype conditions will be permitted.

H. The model shall have a minimum impeller diameter of 12 inches.

I. The model heads shall be the same as the prototype heads.

J. The suction tank shall be designed for and capable of withstanding a minimum suction absolute pressure of (-) 15 ft. of water measure at the level of the centerline of the impeller.

3.0 EXECUTION

3.01 TESTING

A. The model test shall be comprised of four separate tests, Performance Testing, Cavitation Testing, Froude Testing and Model Examination as defined below. Each test shall be witnessed by the Engineer.

B. Performance Test

Performance testing shall be conducted to verify the prototype pump TDH and pool-to-pool performance curves equals or exceeds the specified conditions and the curves submitted with the Contractor's bid. The pump head will be shown as total dynamic head (TDH). The Pool-to-Weir head will be calculated and shown in the pump data and on the pump curves. The performance test shall be in accordance with the following requirements:

1. Three separate tests shall be run at constant speed throughout the entire operating range of the pump at model speeds equivalent to 100%, 95% and 90% of the prototype pump design speed. Changing of pump speed during any test and converting of results by use of the affinity laws WILL NOT be allowed.

2. Each test shall be run with an equivalent suction pool level equal to condition No. 2 in the pump specification and a total head range of 1 ft. to 18 ft. The submergence shall be held constant throughout testing. One additional test shall be run with the suction pool level at (-)5.0 ft.

3. For these tests the model impeller shall be subject to submergences equivalent to or less than that specified for the prototype pump by varying suction absolute pressure with a vacuum pump. A minimum of ten (10) test points shall be used for each test which are evenly distributed across the operating flow range of the pump. The maximum and minimum points and the points in between shall be to the satisfaction of the Engineer. The total head for the model shall be the same or greater as specified for the prototype.

4. Flow characteristics in the suction pool and at the entrance to the suction bell shall be observed and recorded throughout testing.

5. The test shall determine and/or record the following parameters for each point tested:

   a. pool-to-weir head (calculated)
   b . TDH (total dynamic head)
   c. flowrate (capacity)
   d. brake horsepower
   e. pump speed
   f. water temperature
   g. pool-to-weir efficiency (calculated)
   h. pump efficiency
   i. pump submergence
   j. system loss curve at capacities specified

6. Test results shall be plotted to show pool-to-weir head, TDH, pump efficiency, pool-to-weir efficiency, NPSHR and brake horsepower as ordinates against flow in GPM as abscissa for both the model and prototype.

7. Plots shall identify actual pump speed and specific speed of the pump at the point of highest efficiency.

8. The liquid submergence of the model shall be geometrically similar to the prototype submergence.

C. Cavitation Test

Cavitation testing shall be performed to verify that, at the pool-to-weir heads specified, the pump delivers the specified quantities and is free of cavitation and consequential loss of performance, or objectionable vibration or noise. The test shall also determine the critical cavitation coefficient sigma at a minimum of five (5) flow points throughout the full operating range of the pump. These points shall be used to produce the NPSHR curve. Pool-to-Weir heads shall be used in determining all values of sigma. The test shall be performed in accordance with the following requirements:

1. Each of the five (5) tests shall be run at constant speed and constant capacity at Pool-to-Weir heads of 8 ft. to 24 ft. The speed shall be model speed correlating to 100% pump speed. Changing of pump speed during testing and converting of results by use of the affinity laws WILL NOT be allowed.

2. The test shall be run with the suction tank completely full to eliminate all air space. The level in the tank shall be held constant throughout testing. The equivalent submergence of the model impeller (measured at the horizontal centerline of the impeller) shall be the same as the prototype submergence for the particular condition and shall be obtained by varying the absolute pressure on the suction system with a vacuum pump capable of lowering the suction tank pressure to minus (-) 15 ft.

   The pump suction absolute pressure shall be the sum of the liquid level above the centerline of the impeller plus the negative tank pressure (vacuum reading).

3. A minimum of five (5) points (flow points) shall be used to determine seven Critical Sigmas for plotting the NPSH curve. These points shall be equally distributed across the operating flow range of the pump. The maximum and minimum points and the points in between shall be to the satisfaction of the Engineer.

   Each of the sigma curves developed at these five (5) flow conditions shall contain a minimum of ten (10) test points between maximum and minimum.

4. At each flow point, the pump speed and flow rate shall be held constant and the suction conditions varied (by lowering the suction absolute pressure with a vacuum pump) until Critical Sigma is determined. The test shall start at Sigma point "0" with the tank at atmospheric pressure (zero vacuum) and pump head, horsepower, efficiency and Sigma recorded. These values shall then be designated as "Normal Conditions". After plotting head, horsepower and efficiency against Sigma, the test shall proceed to the next point (Sigma point "1") by lowering the suction tank absolute pressure (increasing tank vacuum). This condition shall be held steady for a minimum of three minutes to allow system stabilization before recording and plotting the test results. <u>At each point, data shall be collected and results calculated and plotted before proceeding to the next point.</u> This process shall continue for a minimum of ten (10) Sigma points until Critical Sigma has been determined. These Sigma points shall be chosen to provide at least four points around the value of Critical Sigma, two on each side, and the remaining points evenly distributed across the Sigma plot.

5. Critical Sigma shall be defined as the maximum value of Sigma where either TDH, brake horsepower or efficiency varies by 3% from Normal (Sigma point "0"), whichever occurs first. The value of Critical Sigma shall be less than the corresponding system or Plant Sigma to the satisfaction of the Engineer.

6. Pool-to-Weir head shall be used in determining all values of Sigma.

7. These results shall be plotted to show pool-to-weir head, brake horsepower and pool-to-weir efficiency as ordinates against Sigma as the abscissa for each flow point. The determining value of Critical Sigma shall be identified on each series of curves. The relation of Plant Sigma to the respective critical Sigma shall be shown on the curves.

D. <u>FSI Froude Test</u>

The existing Pump No. 7 Formed Suction Intake design is based on the U.S. Army Corp of Engineer’s Type 10 FSI as indicated on the drawings. All pre-bid physical intake hydraulic model studies were based on the use of the FSI geometries on the prototype FSI. Therefore no Model Similitude or Froude Similarity test will be required as part of their pump package.

E. <u>Model Examination</u>

Unless a model test for the exact geometry and operation conditions has been previously conducted and witnessed, after all testing has been completed, the model shall be dismantled for examination and measurements taken to verify exact

similitude with the prototype impeller and diffuser. This examination shall meet the following requirements:

1. The Contractor shall make available to the Engineer witnessing the test, all necessary facilities and manpower to fully perform all measurements required.

2. Measurements of the impeller shall be taken to verify the following parameters are within acceptable tolerances from the model design values for each blade:

a.	Blade pitch	± 1.5%
b.	Blade rake	± 1.5%
c.	Blade thickness	± 4%, -2%
d.	Angular deviation blade to blade	± 2°
e.	Blade outer radius	± .002"
f.	Radial clearance	Prototype clearance divided by scale factor.

3. Measurements of the impeller shall be taken from a reference plane to the top and bottom surfaces of a blade at 10 degrees rotational increments starting at the leading edge of the blade and proceeding toward the trailing edge. This process shall be pursued at five (5) radial distances between the impeller blade root at the cone to the impeller outer edge.

F. All recorded test data sheets shall be initialed by the witnessing Engineer and copies provided to him after the completion of each test.

END OF SECTION

SECTION 22 11 13

FACILITY PIPING & VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general piping and related components for Raw Water Piping and Engine Coolant Piping.

1.3 DEFINITIONS

A. EPDM: Ethylene propylene diene terpolymer rubber.

B. LLDPE: Linear, low-density polyethylene plastic.

C. PA: Polyamide (nylon) plastic.

D. PE: Polyethylene plastic.

E. PP: Polypropylene plastic.

F. PVC: Polyvinyl chloride plastic.

G. RTRF: Reinforced thermosetting resin (fiberglass) fittings.

H. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

1. Wiring Diagrams: Power, signal, and control wiring for alarms.

C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Distribution and Systems Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Owner's written permission.

1.8 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS – RAW WATER PIPING

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Flanges: ASME 16.1, Class 125, cast iron.

2.2 STEEL PIPING – ENGINE COOLANT

A. See Part 3 piping schedule articles for where pipes, tubes, fittings, and joining materials are applied in various services.

B. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M, for butt and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
   a. Material Group: 1.1.
   b. End Connections: Threaded or butt welding to match pipe.
   c. Lapped Face: Not permitted underground.
   d. Gasket Materials: Asbestos free, ASME B16.20 metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
   e. Bolts and Nuts: Flange bolts shall be ASTM A193, Grade B8M and nuts shall be ASTM A194, Grade 8M.

C. Stainless Steel Pipe: ASTM A 312, Type 304, Schedule 40
   1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
   2. Welding Fittings: ASTM A 403, for butt welding.
   3. Forged-Steel Flanges and Flanged Fittings: ASTM A182 F 304, minimum Class 150, raised face, including stainless steel bolts and nuts, and gaskets of the following material group, end connections, and facings:
      a. Material Group: 1.1.
      b. End Connections: Threaded or butt welding to match pipe.
      c. Lapped Face: Not permitted underground.
      d. Gasket Materials: Asbestos free, ASME B16.20 metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
      e. Bolts and Nuts: Flange bolts shall be ASTM A193, Grade B8M and nuts shall be ASTM A194, Grade 8M.

2.3 BUTTERFLY VALVES – RAW WATER & COOLANT PIPING

A. AWWA Butterfly Valves:

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. DeZURIK/Copes-Vulcan; a unit of SPX Corporation.
      b. Milliken Valve Company.
      c. Mosser Valve; a division of Olson Technologies, Inc.
      d. Mueller Co.; Water Products Div.
      e. Pratt, Henry Company.
      f. Val-Matic Valve & Manufacturing Corp.

   2. Description: Rubber seated.

      a. Standard: AWWA C504.
      b. Body: Cast or ductile iron.
      c. Body Type Wafer or flanged.
      d. Pressure Rating: 150 psig.
      e.

2.4 ARCH TYPE EXPANSION JOINTS – ENGINE COOLANT

A. Body: The body or carcass shall be a multiple-layered, fabric reinforced, synthetic material surrounding an internal tube fitted with double-arch expansion chambers. The chambers, or arches, shall be filled to minimize sediment build-up. The carcass shall be a molded piece with metal reinforcing rings to provide rigidity for vacuum service. The ends shall be molded to flanged configuration conforming to ANSI 125 # dimensions.

B. Ends and Hardware: The Flanged ends shall be supplied with carbon steel split retaining rings that are drilled to the same ANSI 125 # Standard, and which fit to the back faces of the flanges. The split rings shall be hot dipped galvanized. All bolts used in jointing shall be 316 stainless steel. Install using anti-sieze compound to prevent galling.

C. MATERIALS: The tube lining shall be Nitrile (Buna N), and layer cover shall be Hypalon, rated for a temperature of 225 degrees F and resistant to UV and ozone.

D. All 3” and 4” arch type expansion joints that connect to the engine gridcooler piping shall be single arch.

E. Arch-Type Expansion Joints shall be as manufactured by Mercer Rubber Co., Redflex as manufactured by Red Valve Company or approved equal.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

3.2 PIPING INSTALLATION

A. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

B. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

C. Sleeves are specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

D. Mechanical sleeve seals are specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

E. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

F. See Division 21 Section "Water-Based Fire-Suppression Systems" for fire-suppression-water piping inside the building.

G. See Division 22 Section "Domestic Water Piping" for potable-water piping inside the building.

3.3 JOINT CONSTRUCTION

A. See Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
6. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.
8. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

    a. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples.
    b. Dielectric Fittings for NPS 2-1/2 to NPS 4. Use dielectric flanges.
    c. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.4 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.

2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
4. Fire-Service-Main Piping: According to NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.5 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.

E. MSS Valves: Install as component of connected piping system.

3.6 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect water-distribution piping to interior domestic water and fire-suppression piping.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.7 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.8 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

   a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
   b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
   c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
   d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION

SECTION 22 15 13

GENERAL-SERVICE COMPRESSED-AIR PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping and related specialties for general-service compressed-air systems operating at 250 psig or less.

B. Related Sections include the following:

1. Division 22 Section "General-Service Air Compressor Receivers" for general-service air compressors and accessories.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. CR: Chlorosulfonated polyethylene synthetic rubber.

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. HDPE: High-density polyethylene plastic.

E. NBR: Acrylonitrile-butadiene rubber.

F. PE: Polyethylene plastic.

G. PVC: Polyvinyl chloride plastic.

H. High-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures between 150 and 250 psig.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Pipes, fittings, and valves.
2. Safety valves.

3. Automatic drain valves.

B. Welding certificates.

C. Qualification Data: For Installers.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For general-service compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Extruded-Tee Outlet Procedure: Qualify operators according to training provided by T-DRILL Industries Inc., for making branch outlets.
2. Pressure-Seal Joining Procedure for Steel Piping. Qualify operators according to training provided by Victaulic Company.

B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

C. ASME Compliance:

1. Comply with ASME B31.1, "Power Piping," for high-pressure compressed-air piping.
2. Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Compressed-Air Service: Do not interrupt compressed-air service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary compressed-air service according to requirements indicated:

1. Notify Construction Manager Owner no fewer than two days in advance of proposed interruption of compressed-air service.
2. Do not proceed with interruption of compressed-air service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Schedule 40, Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B, hot-dip zinc coated with ends threaded according to ASME B1.20.1.

1. Steel Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized seamless steel pipe. Include ends matching joining method.
2. Malleable-Iron Fittings: ASME B16.3, Class 150 or 300, threaded.
3. Malleable-Iron Unions: ASME B16.39, Class 150 or 300, threaded.
4. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel, threaded.
5. Wrought-Steel Butt-Welding Fittings: ASME B16.9, Schedule 40.
6. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel.

    a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Anvil International, Inc.
        2) Star Pipe Products; Star Fittings Div.
        3) Victaulic Company.
        4) Ward Manufacturing, Inc.
    c. Couplings: AWWA C606 or UL 213, for steel-pipe dimensions and rated for 300-psig minimum working pressure. Include ferrous housing sections, gasket suitable for compressed air, and bolts and nuts. Provide EDPM gaskets for oil-free compressed air. Provide NBR gaskets if compressed air contains oil or oil vapor.

B. Transition Couplings for Metal Piping: Metal coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for compressed-air piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

    a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, stainless steel, unless otherwise indicated.

C. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.3 VALVES

A. Metal Ball Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping."

2.4 SPECIALTIES

A. Safety Valves: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," construction; National Board certified, labeled, and factory sealed; constructed of bronze body with poppet-type safety valve for compressed-air service.

1. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.

B. Manual Drain Valves: Stainless-steel body and internal parts, rated for 200-psig minimum working pressure, capable of manual discharge of collected condensate. Show capacities of filters in two paragraphs below on Drawings.

C. Pressure Reducing Valves: Provide pressure regulators stations complete with self contained automatic pressure reducing valve, bypass, and low pressure side relief valve and gauge. The valves shall be suitable to reduce pressure from 250 psi to 150 psi with 40 CFM minimum flow, and from 150 PSI to 80 PSI with 20 CFM of flow. The bodies for the pressure reducing regulator valves shall be bronze, suitable for 400 PSI service, with NPT ends sized for the piping as shown on the drawings. Valve shall be single seated with renewable, resilient seating disc. The main valve shall be hardened 18-8 stainless steel stem with Neoprene Seating Disc. Controlling valve shall be phosphor bronze and monel. Controlling valve seats shall be phosphor bronze with plastic seating surface. Piston, cylinder, and liner shall be bronze with a rubber O-ring seal. Reducing valves shall be Leslie LAE-5 or equal.

D. Quick exhaust valves for pneumatic clutches and pneumatic valve operators shall be Mead Fluid Dynamics, Model #1BQEV or approved equal.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. High-Pressure Compressed-Air Distribution Piping: Use the following piping materials for each size range:

1. NPS 2 and Smaller: Schedule 40, galvanized -steel pipe; threaded, malleable-iron fittings; and threaded joints.

B. Drain Piping: Use the following piping materials:

1. NPS 2 and Smaller: Type M copper tube; wrought-copper fittings; and brazed or soldered joints.

3.2 VALVE APPLICATIONS

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for metal general-duty valves. Use metal valves, unless otherwise indicated.

1. Metal General-Duty Valves: Use valve types specified in "Valve Applications" Article in Division 22 Section "General-Duty Valves for Plumbing Piping" according to the following:
   a. High-Pressure Compressed Air: Valve types specified for medium-pressure compressed air.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

C. Install piping adjacent to equipment and machines to allow service and maintenance.

D. Install air and drain piping with 1 percent slope downward in direction of flow.

E. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating, unless otherwise indicated.

F. Equipment and Specialty Flanged Connections:

   1. Use steel companion flange with gasket for connection to steel pipe.

G. Flanged joints may be used instead of specified joint for any piping system.

H. Install eccentric reducers where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

I. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

J. Install piping to permit valve servicing.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and branch connections.

M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

N. Install sleeve seals for piping penetrations of concrete walls and slabs.

O. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints for Steel Piping: Join according to AWS D10.12/D10.12M.

E. Flanged Joints: Use asbestos-free, nonmetallic gasket suitable for compressed air. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.

F. Dissimilar Metal Piping Material Joints: Use dielectric fittings.

3.5 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping."

B. Install shutoff ball valve at inlet to each tank.

3.6 SPECIALTY INSTALLATION

A. Install safety valves on receivers in quantity and size to relieve at least the capacity of connected air compressors.

B. Install manual drain valves on receivers and automatic drain valves on aftercoolers. Discharge condensate to exterior.

C. Install pressure reducing valves and accumulator tanks as indicated.

3.7 CONNECTIONS

A. Install unions, in piping NPS 2” and smaller, adjacent to each valve and at final connection to each piece of equipment and machine.

B. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment and machine.

3.8 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

B. Vertical Piping: MSS Type 8 or 42, clamps.

C. Individual, Straight, Horizontal Piping Runs:

1. 100 Feet or Less: MSS Type 1, adjustable, steel clevis hangers.

D. Support horizontal piping within 12 inches of each fitting and coupling.

E. Install hangers for Schedule 40, steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 2: 13 feet with 3/8-inch rod.

F. Install supports for vertical, Schedule 40, steel piping every 15 feet.

G. Install supports for vertical, Schedule 5, steel piping every 10 feet.

H. Install supports for vertical copper tubing every 10 feet .

I. Install supports for vertical ABS piping every 48 inches .

3.9 LABELING AND IDENTIFICATION

A. Install identifying labels and devices for general-service compressed-air piping, valves, and specialties.

3.10 FIELD QUALITY CONTROL

A. Perform field tests and inspections.

B. Tests and Inspections:

1. Piping Leak Tests for Metal Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 50 psig above system operating pressure, but not less than 250 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
2. Repair leaks and retest until no leaks exist.

C. Prepare test reports.

3.11 FINISH

A. The compressed air piping, exterior surfaces of the receiver and receiver supports shall receive the following surface preparation and coatings:

1) Abrasive Blast to Commercial Blast Standards in accordance with SSPC-SP6
2) 1st – TNEMEC or Equal Series 66 Epoxy Polyamide Hi-Build, 4.0-6.0 mils D.F.T.
3) 2nd – TNEMEC or Equal Series 71 Polyester Polyurethane 1.5-2.5 mils D.F.T.

END OF SECTION

SECTION 22 15 15

ENGINE EXHAUST PIPING AND SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes piping and related specialties for engine exhaust systems.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Pipes and fittings
2. Expansion Joints.

B. Welding certificates.

C. Qualification Data: For Installers.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For engine exhaust piping specialties to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Welding: Qualify processes and operators according to AWS D1.1/D1.1M..

B. ASME Compliance:
1. Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

1.5 PROJECT CONDITIONS

A. Interruption of Engine Operation: Do not interrupt pump engine operation to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary compressed-air service according to requirements indicated:

1. Notify Construction Manager Owner no fewer than two days in advance of proposed interruption of pump engine service.
2. Do not proceed with interruption of pump engine service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

A. Schedule 20, Steel Pipe: ASTM A 53, Grade B, seamless, black.
   1. Wrought-Steel Butt-Welding Fittings: ASTM A 234, Grade WPB, ASME B16.9, Schedule 20.
   2. Steel Flanges: ASME B16.5, Class 150 carbon steel.

2.2 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for high temperature service.

   1. 1/8-inch maximum thickness, Garlock Style 3123.
      a. Narrow-Face Type: For raised-face, Class 150, steel flanges.

B. Flange Bolts and Nuts: ASTM A 193 Grade B8M and ASTM A 194 Grade 8M, stainless steel, unless otherwise indicated.

C. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.3 Expansion Joints

A. Engine Exhaust Expansion Joints: Expansion Joints for High Temperature Service (900 Deg. F) shall be supplied where shown on the drawings. These shall be sized to facilitate both lateral and axial thermal expansion on the exhaust piping.

   1. American Boa Series 4025E or Equal: 8 1/2” Axial Expansion, 1 1/2” Lateral offset, 250 lb. axial spring rate, 15 3/4” overall length, Type FSP.

2.4 Insulation

A. Exhaust Piping Insulation: Pre-molded, calcium silicate, temperature range 100 degrees F to 1200 degrees F, “Clatemp” as manufactured by PABCO or equal, with # 26 gauge aluminum sheet banded with # 22 gauge stainless steel straps.

B. Terminate all insulation at building interior wall with aluminum cap.

C. Exhaust insulation shall be 3 inches thick for piping 8 inches and larger, 2 inches thick for piping 6 inches and smaller.

2.5 Finish

A. High Heat portions of Exhaust Piping and Exhaust Supports: All high heat portions except stainless steel shall receive the following surface preparation and coating:
   1) Abrasive Blast to remove all rust and scale in accordance with SSPC-SP6.
   2) Ist - Primer – Silicone, TNEMEC or Equal Y-5541 Silicone Hi-Temp Primer – 0.9 mils
   3) 2nd – diffuse, silicone, TNEMEC or Equal Y-5542 Silicone Hi-Temp Primer – 0.7 mils
   4) 3rd - diffuse, silicone, TNEMEC or Equal Y-5542 Silicone Hi-Temp Primer – 0.7 mils

B. Portions of the exhaust system support that are not intended to be galvanized and are subjected to moderate temperatures (below 200 deg. F) shall receive the following surface preparation and coatings:
   1) Abrasive Blast to Commercial Blast Standards in accordance with SSPC-SP6
   2) 1st – TNEMEC or Equal Series 66 Epoxy Polyamide Hi-Build, 4.0-6.0 mils D.F.T.
   3) 2nd – TNEMEC or Equal Series 71 Polyester Polyurethane 1.5-2.5 mils D.F.T.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. High-Temperature Engine Exhaust Piping: Use the following piping materials for each size range:

   1. NPS 18 and Smaller: Schedule 20, black -steel pipe; butt-welded, wrought steel butt-weld fittings.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of exhaust piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

C. Equipment and Specialty Flanged Connections:

   1. Use steel companion flange with gasket for connection to existing silencer.

D. Flanged joints may be used instead of specified joint for any piping system.

E. Install piping free of sags and bends.

F. Install fittings for changes in direction and branch connections.

G. Install sleeves for piping penetrations of walls.

H. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with all architectural requirements.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Welded Joints for Steel Piping: Join according to AWS D10.12/D10.12M.

D. Flanged Joints: Use asbestos-free, gasket suitable for high temperature exhaust. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements all support requirements as indicated on the contract drawings.

3.5 FIELD QUALITY CONTROL

A. Perform field tests and inspections.

B. Tests and Inspections:

1. Piping Leak Tests for Exhaust Piping: Soap Bubble Test new and modified parts of exhaust piping.
2. Repair leaks and retest until no leaks exist.

END OF SECTION

SECTION 23 11 13

FACILITY FUEL-OIL PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes diesel-fuel-oil distribution systems and the following:

1. Pipes, tubes, and fittings.
2. Piping and tubing joining materials.
3. Piping specialties.
4. Valves.

1.3 DEFINITIONS

A. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

1.4 PERFORMANCE REQUIREMENTS

A. Maximum Operating-Pressure Ratings: 3-psig fuel-oil supply pressure at oil-fired appliances.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, and dimensions of individual components and profiles. Also include, where applicable, rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1. Piping specialties.
2. Valves: Include pressure rating, capacity, settings, and electrical connection data of selected models.

B. Coordination Drawings: Plans and details, drawn to scale, on which fuel-oil piping is shown and coordinated with other installations, using input from installers of the items involved.

C. Brazing certificates.

D. Welding certificates.

E. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

B. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

D. Comply with ASME B31.9, "Building Services Piping," for fuel-oil piping materials, installation, testing, and inspecting.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store pipes and tubes with protective PE coating to avoid damaging the coating and to protect from direct sunlight.

1.8 PROJECT CONDITIONS

A. Interruption of Existing Fuel-Oil Service: Do not interrupt fuel-oil service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary fuel-oil supply according to requirements indicated:

1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of fuel-oil service.
2. Do not proceed with interruption of fuel-oil service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. See Part 3 piping schedule articles for where pipes, tubes, fittings, and joining materials are applied in various services.

B. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M, for butt and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: Asbestos free, ASME B16.20 metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
    e. Bolts and Nuts: ASME B18.2.1, cadmium-plated steel.

2.2 PIPING SPECIALTIES

A. Flexible Connectors: Comply with UL 567.

1. Metallic Connectors:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

        1) American Flexible Hose Co., Inc.
        2) Flexicraft Industries.
        3) FLEX-ING, Inc.
        4) Hose Master, Inc.
        5) Metraflex Company (The).
        6) Proco Products, Inc.
        7) Tru-Flex Metal Hose Corp.
        8) Unaflex.

    b. Listed and labeled for aboveground and underground applications by an NRTL acceptable to authorities having jurisdiction.
    c. Stainless-steel bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
    d. Minimum Operating Pressure: 150 psig.
    e. End Connections: Socket, flanged, or threaded end to match connected piping.

f. Maximum Length: 18 inches.
g. Swivel end, 50-psig maximum operating pressure.
h. Factory-furnished anode.

2. Nonmetallic Connectors:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) American Flexible Hose Co., Inc.
2) Flexicraft Industries.
3) FLEX-ING, Inc.
4) Hose Master, Inc.
5) Metraflex Company (The).
6) Tru-Flex Metal Hose Corp.

b. Listed and labeled for underground applications by an NRTL acceptable to authorities having jurisdiction.
c. PFTE bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
d. Minimum Operating Pressure: 150 psig .
e. End Connections: Socket, flanged, or threaded end to match connected piping.
f. Maximum Length: 18 inches .
g. Swivel end, 50-psig maximum operating pressure.
h. Factory-furnished anode.

B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 80-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.
5. Installation: Provide at all equipment without factory installed Strainers.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for fuel oil.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL FUEL-OIL SHUTOFF VALVES

A. See valve schedule in Part 3 for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller for Liquid Service: Comply with UL 842.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.
5. Service Mark: Initials "WOG" shall be permanently marked on valve body.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for fuel-oil piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off fuel oil to premises or piping section.

B. Comply with NFPA 30 and NFPA 31 requirements for prevention of accidental ignition.

3.3 INDOOR PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Verify final equipment locations for roughing-in.

I. Conceal pipe installations in walls, pipe spaces, or utility spaces; above ceilings; below grade or floors; and in floor channels unless indicated to be exposed to view.

J. Prohibited Locations:

1. Do not install fuel-oil piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
2. Do not install fuel-oil piping in solid walls or partitions.

K. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

L. Connect branch piping from top or side of horizontal piping.

M. Install unions in pipes NPS 2 and smaller at final connection to each piece of equipment and elsewhere as indicated. Unions are not required on flanged devices.

N. Do not use fuel-oil piping as grounding electrode.

O. Install Y-pattern strainer on inlet side of fuel-oil pump.

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 23 Section "Sleeves and Sleeve Seals for HVAC Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 23 Section "Escutcheons for HVAC Piping."

3.4 VALVE INSTALLATION

A. Install manual fuel-oil shutoff valves on branch connections to fuel-oil appliance.

B. Install valves in accessible locations.

C. Protect valves from physical damage.

D. Install metal tag attached with metal chain indicating fuel-oil piping systems.

E. Identify valves as specified in Division 23 Section "Identification for HVAC Piping and Equipment."

F. Install oil safety valves at inlet of each oil-fired appliance.

G. Install pressure relief valves in distribution piping between the supply and return lines.

H. Install one-piece, bronze ball valve with hose end connection at low points in fuel-oil piping.

I. Install manual air vents at high points in fuel-oil piping.

J. Install emergency shutoff valves at dispensers.

3.5 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Bevel plain ends of steel pipe.
2. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness for service application. Install gasket concentrically positioned.

G. Flared Joints: Comply with SAE J513. Tighten finger tight, then use wrench according to fitting manufacturer's written recommendations. Do not overtighten.

H. Fiberglass-Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.6 HANGER AND SUPPORT INSTALLATION

A. Pipe hanger and support and equipment support materials and installation requirements are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1-1/4 and Smaller: Maximum span, 84 inches; minimum rod size, 3/8 inch.

2. NPS 1-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.
4. NPS 2-1/2: Maximum span, 11 feet; minimum rod size, 1/2 inch.
5. NPS 3: Maximum span, 12 feet; minimum rod size, 1/2 inch.
6. NPS 4: Maximum span, 13 feet; minimum rod size, 5/8 inch.

C. Support vertical steel pipe at each floor and at spacing not greater than 15 feet.

3.7 CONNECTIONS

A. Install piping adjacent to equipment to allow service and maintenance.

B. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.

C. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.

D. Connect piping to equipment with ball valve and union. Install union between valve and equipment.

E. Install flexible piping connectors at final connection engines and day tanks.

3.8 FIELD PAINTING OF ABOVEGROUND PIPING

A. Comply with requirements in Division 09 painting Sections for painting interior and exterior fuel-oil piping.

B. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.9 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Piping: Minimum hydrostatic or pneumatic test-pressures measured at highest point in system:

a. Fuel-Oil Distribution Piping: Minimum 25 psig for minimum 30 minutes.

b. Isolate storage tanks if test pressure in piping will cause pressure in storage tanks to exceed 10 psig.

2. Inspect and test fuel-oil piping according to NFPA 31, "Tests of Piping" Paragraph; and according to requirements of authorities having jurisdiction.
3. Bleed air from fuel-oil piping using manual air vents.
4. Fuel oil return and supply piping shall be flushed after fabrication to remove all debris. Contractor shall provide temporary pumping capability to establish a 10 ft.sec. celocity in the 2” return piping. Minimum pump capability shall be 100 gpm at 20 ft. TDH. Contractor shall supply all flushing fluid and filtration to filter out all debris 100 microns (.004”) and diameter.

D. Fuel-oil piping and equipment will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 INDOOR PIPING SCHEDULE

A. Aboveground fuel-oil piping shall be one of the following:

1. NPS 1/2 and Smaller: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.
2. NPS 5/8 to NPS 2 Steel pipe, steel or malleable-iron socket welded fittings.
3. NPS 2-1/2 and Larger: Steel pipe, steel fittings, and welded or flanged joints.
4. Steel pipe with wrought-steel fittings and welded joints.

3.11 ABOVEGROUND MANUAL FUEL-OIL SHUTOFF VALVE SCHEDULE

A. Valves in branch piping for single appliance shall be one of the following:

1. Three-Piece, Full-Port, Carbon Steel Ball Valves with Stainless Trim: MSS SP-110.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

Section 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 MEASUREMENT AND PAYMENT

A. Measurement and payment for low-voltage electrical power conductors and cables for electrical systems shall be paid at the lump sum contract price bid for “Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70.

B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN, XHHW.

C. Multiconductor Cable: Comply with NEMA WC 70 for Type SO with ground wire.

2.2 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-THWN, XHHW, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THWN, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THWN, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

J. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Sections "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

   1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

I. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test conductors for compliance with requirements.

2. All conductors shall pass a continuity and megger insulation test. Use conductor manufacturer recommended voltages for testing each appropriate insulation rating.

3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
4. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.

   a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
   b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
   c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
4. All test reports shall be submitted to the Engineer for review and be included in final close out documentation.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

Section 26 05 23

CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Low-voltage control cabling.
2. Control-circuit conductors.
3. Identification products.

1.2 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

B. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of an NRTL.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

B. Test each pair of UTP cable for open and short circuits.

1.8 MEASUREMENT AND PAYMENT

A. Measurement and payment for control voltage electrical power cables for electrical systems shall be paid at the lump sum contract price bid for “Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.

1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 LOW-VOLTAGE CONTROL CABLE

A. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.

5. Flame Resistance: Comply with NFPA 262.

C. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

D. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Plastic jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.3 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN in raceway, complying with UL 83, UL 44.

B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83, UL 44.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.

2.4 IDENTIFICATION PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. HellermannTyton.
3. Kroy LLC.
4. Panduit Corp.

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

A. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

B. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.

C. Install manufactured conduit sweeps and long-radius elbows if possible.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. Installation of Control-Circuit Conductors:

1. Install wiring in raceways. Comply with requirements specified in Division 26 Section "Raceway and Boxes for Electrical Systems."

C. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.

2. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

3. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
4. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits, No. 14 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits, No 12 AWG.

3.4 FIRESTOPPING

A. Comply with requirements in Division 07 Section "Penetration Firestopping."

B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. For data communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.6 IDENTIFICATION

A. Identify system components, wiring, and cabling according to TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 260523

THIS PAGE INTENTIONALLY LEFT BLANK

Section 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

1.5 MEASUREMENT AND PAYMENT

A. Measurement and payment for grounding and bonding for electrical systems shall be paid at the lump sum contract price bid for "Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment", which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.

2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad, steel; 3/4 inch diameter by 10 feet long (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.

B. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

C. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.

1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch (6.3-by-100-by-300-mm) grounding bus.
3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

D. Metal and Wood Poles Supporting Outdoor Lighting Fixtures or equipment: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

C. Grounding and Bonding for Piping:

1. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.4 LABELING

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.

B. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System: 10 ohms.
2. Power Distribution Units or Panelboards Serving Electronic Equipment: 10 ohm(s).

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

Section 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.3 ACTION SUBMITTALS

A. Product Data: For steel slotted support systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.6 MEASUREMENT AND PAYMENT

A. Measurement and payment for hangers and supports for electrical systems shall be paid at the lump sum contract price bid for “Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.; a division of Cooper Industries.
    c. ERICO International Corporation.
    d. GS Metals Corp.
    e. Thomas & Betts Corporation.
    f. Unistrut; Tyco International, Ltd.
3. Constructed of 316 stainless steel.
4. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron, hot dipped galvanized, or stainless steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

   a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Hilti Inc.
      2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      3) MKT Fastening, LLC.
      4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

   a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Cooper B-Line, Inc.; a division of Cooper Industries.
      2) Hilti Inc.
      3) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      4) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, hot dipped galvanized slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates. All fabrications shall be hot dipped galvanized after fabrication.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NFPA 70 (NEC), NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts or Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes,

transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

Section 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetal conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

1.4 MEASUREMENT AND PAYMENT

A. Measurement and payment for raceways and boxes for electrical systems shall be paid at the lump sum contract price bid for “Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. ARC: Comply with ANSI C80.5 and UL 6A.

D. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

F. Joint Compound for GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. RNC: Type EPC-40-PVC or schedule 80 as indicated, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. Fittings for and RNC: Comply with NEMA TC 3; match to conduit type and material.

D. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, 3R or 4 as indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, galvanized ferrous alloy, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast steel with neoprene gasketed cover and stainless steel screws.

G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

H. Gangable boxes are prohibited.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, 3R, 4 as indicated with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

J. Cabinets:

1. NEMA 250, Type 1, 3R, 4 as indicated, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC (ARC for grounds).
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: RNC, Type EPC-40-PVC, Type EPC-80-PVC, direct buried or concrete encased as indicated.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R or 4X as indicated.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: GRC.
2. Exposed, Not Subject to Severe Physical Damage: GRC.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   c. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: GRC .
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 3R, except use NEMA 250, Type 4X stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

F. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches (300 mm) of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Engineer for each specific location.
5. Change from RNC to GRC before rising above floor.

I. Stub-ups to Above Recessed Ceilings:

1. Use RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35-mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

O. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

P. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

Q. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
   d. Attics: 135 deg F (75 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F (0.06 mm per meter of length of straight run per degree C) of temperature change for PVC conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints. Install expansion fittings in vertical portion of Service Entrance Conduits where they emerge from the ground at the building.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

R. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 18 inches (460 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

T. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

U. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

V. Locate boxes so that cover or plate will not span different building finishes.

W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

Y. Set metal floor boxes level and flush with finished floor surface.

Z. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

Section 26 05 44

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 MEASUREMENT AND PAYMENT

A. Measurement and payment sleeves and sleeve seals for electrical raceways and cabling shall be paid at the lump sum contract price bid for “Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

    a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Advance Products & Systems, Inc.
    b. CALPICO, Inc.
    c. Metraflex Company (The).
    d. Pipeline Seal and Insulator, Inc.
    e. Proco Products, Inc.

2. Sealing Elements: Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Stainless steel.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Presealed Systems.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.

4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

Section 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 MEASUREMENT AND PAYMENT

A. Measurement and payment for identification for electrical systems shall be paid at the lump sum contract price bid for “Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field
2. Legend: Indicate voltageand system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

D. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.4 FLOOR MARKING TAPE

A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 42 INCHES (915 MM)."
3. ARC Flash: Lavel to identify potential electric arc flash hazards in compliance with the requirements of NFPA 70E and ANSI Z535.4.

2.6 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with [black letters on white face].
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.7 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

F. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Install labels at 10-foot (3-m) maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Emergency Power.
2. Power.
3. UPS.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.

3) Phase C: Dark Blue.

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

d. Colors for control circuits
1) General purpose a-c control: Pink
2) General purpose d-c control: Light Blue

e. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

E. Conductors to Be Extended in the Future: Attach write-on tags or marker tape to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels, Baked-enamel warning signs, Metal-backed, butyrate warning signs.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.
b. Controls with external control power connections.

I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer, or emergency operations.

K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 260553

THIS PAGE INTENTIONALLY LEFT BLANK

Section 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches.
4. Wall-switch.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 MEASUREMENT AND PAYMENT

A. Measurement and payment for wiring devices for electrical systems shall be paid at the lump sum contract price bid for “Raceway, Boxes, Fittings, Conductors, & Miscellaneous Electrical Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Cooper; 5351 (single), CR5362 (duplex).
b. Hubbell; HBL5351 (single), HBL5352 (duplex).
c. Leviton; 5891 (single), 5352 (duplex).
d. Pass & Seymour; 5361 (single), 5362 (duplex).

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.

3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Cooper; VGF20.
b. Hubbell; GFR5352L.
c. Pass & Seymour; 2095.
d. Leviton; 7590.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Single Pole:

1) Cooper; AH1221.
2) Hubbell; HBL1221.
3) Leviton; 1221-2.
4) Pass & Seymour; CSB20AC1.

b. Two Pole:

1) Cooper; AH1222.
2) Hubbell; HBL1222.
3) Leviton; 1222-2.
4) Pass & Seymour; CSB20AC2.

c. Three Way:

1) Cooper; AH1223.
2) Hubbell; HBL1223.
3) Leviton; 1223-2.
4) Pass & Seymour; CSB20AC3.

d. Four Way:

1) Cooper; AH1224.
2) Hubbell; HBL1224.
3) Leviton; 1224-2.
4) Pass & Seymour; CSB20AC4.

C. Pilot-Light Switches, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Cooper; AH1221PL for 120 and 277 V.
    b. Hubbell; HBL1201PL for 120 and 277 V.
    c. Leviton; 1221-LH1.
    d. Pass & Seymour; PS20AC1RPL for 120 V, PS20AC1RPL7 for 277 V.

2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."

2.6 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Stainless steel.
2. Material for Unfinished Spaces: Galvanized steel
3. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant**,** die-cast aluminum with lockable cover.

2.7 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Gray unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.
3. TVSS Devices: Blue.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

Section 26 28 13

FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers, and motor-control centers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA FU 1 for cartridge fuses.

C. Comply with NFPA 70.

1.5 MEASUREMENT AND PAYMENT

A. Measurement and payment for fuses for electrical systems shall be paid at the lump sum contract price bid for “Electrical Distribution Equipment”, which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Bussmann, Inc.
2. Ferraz Shawmut, Inc.
3. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

B. All fuses rated 30 amps and higher shall have a blown fuse indicator window.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Service Entrance: Class RK5, dual element, time delay, 200KAIC.

B. Feeders: Class RK5, dual element, time delay, 200KAIC.

C. Motor Branch Circuits: Class RK5, dual element, time delay, 200KAIC.

D. Other Branch Circuits: Class RK5, dual element, time delay, 200KAIC.

E. Control Circuits: Class CC, fast acting.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable and in the upright position. Information shall be legible without removing fuse.

B. Install all fuses using oxidation inhibiting compound on all fuse blades and fuse holders.

3.3 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 262813

THIS PAGE INTENTIONALLY LEFT BLANK

Section 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

1.8 MEASUREMENT AND PAYMENT

A. Measurement and payment for enclosed switches and circuit breakers for electrical systems shall be paid at the lump sum contract price bid for "Electrical Distribution Equipment", which price shall be full compensation for all labor, material, equipment, and all other miscellaneous and incidental work as specified and shown on drawings. Payment shall be paid based on percent of work completed/installed according to the schedule of values to be submitted by contractor with each pay application.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Suitable for number, size, and conductor material.
5. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

2.3 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Match existing.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.

3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

F. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Ground-Fault Protection (where indicated): Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip (where indicated): Trip coil energized from separate circuit, with coil-clearing contact.
6. Auxiliary Contacts (where indicated): One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
7. Alarm Switch (where indicated) : One NO contact that operates only when circuit breaker has tripped.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 3R.
2. Outdoor Locations: NEMA 250, Type 4X, stainless steel.
3. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: Type 4X, stainless steel.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements to withstand seismic forces according to SEI/ASCE 7.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices. Install fuses using oxide inhibitor compound on fuse blades and fuseholders.

E. Comply with NECA 1.

3.2 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes thermal scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 31 23 16

EXCAVATION

1.0 GENERAL

1.01 RELATED WORK

A. Section 31 10 00 - Site Clearing

B. Section 31 23 23 - Embankment and Backfill

C. Section 32 92 19 - Seeding and Fertilizing

1.02 DESCRIPTION

A. This Section covers the excavation work and bracing required to construct the project and shall include excavation, dredging, undercutting, and trenching as required; handling, storage, transportation and disposal of all excavated material; all shoring, preparation of subgrades, pumping and dewatering as necessary or required; protection of adjacent property, and other appurtenant work.

1.03 QUALITY ASSURANCE

A. Perform excavation work in compliance with applicable requirements of the Louisiana Standard Specification for Roads and Bridges and other governing authorities having jurisdiction.

B. Testing and Inspection Service: The Owner will employ an independent laboratory to perform soil testing as required.

1.04 SUBMITTALS

A. The Contractor shall prepare a plan for excavation limits and side slopes of excavated areas of the project. If cofferdams are necessary due to limited area or unstable soil conditions, the Contractor shall prepare a plan for the excavation and for cofferdams and bracing required to maintain the excavations. The design and construction of all temporary cofferdams is the sole responsibility of the Contractor. The submitted cofferdam design and plan shall include the nature and location of all surcharge loads as the cofferdam upon completion of construction, along with the Contractor's method and sequence of installation. The Contractor shall submit the plan to the Engineer for review in accordance with Section 01 33 00 before starting on any large excavation.

B. The Contractor shall retain the services of a professional who is experienced with excavation and bracing in soil and ground water conditions in the project area. The design and construction activities shall include measures to prevent general area subsidence from lowering the water table. The professional shall observe and cause corrections as necessary to all construction activities and procedures so settlement or any harmful effects on existing structures or utilities will not occur. The plan and

calculations prepared by the professional shall be submitted to the Engineer for review. All drawings and design analysis shall be stamped and signed by a professional engineer registered in the state of the construction project.

C. Where dredging is required, the Contractor shall include in his excavation plan the proposed techniques for minimizing turbidity in the water body and maintenance for navigation. The Contractor shall employ the use of gunderbooms or turbidity curtains to minimize the impacts to the water body. The Contractor shall allow navigation of boats through the project site.

1.05 UNDERGROUND INSTALLATIONS

A. Existing underground installations are indicated on the drawings only to the extent such information was made available to or discovered by Engineer in preparing the drawings. There is no guarantee as to the accuracy or completeness of such information, and all responsibility for accuracy and completeness thereof is expressly disclaimed.

B. Contractor shall be responsible for discovery of existing underground installations, in advance of excavating or trenching, by examining all visible topographic items and contacting all local utilities, and by prospecting.

1.06 SUBSURFACE OBSTRUCTIONS

A. In excavation care shall be taken not to remove, disturb or injure existing utility pipes, conduits or structures, without the approval of the Engineer. If necessary, the Contractor at his own expense shall sling, shore-up, and maintain such structures in operation, and within a reasonable time shall repair any damage done thereto. Repairs to these facilities shall be made to the satisfaction of the Engineer.

B. In the event that subsurface structures are broken or damaged in the prosecution of the work, the Contractor shall immediately notify the proper authorities, and at the option of said authority, either repair the damage at once, at his own expense, or pay the affected owner the proper charges for repairing said damage. The Contractor shall be responsible for any damage to persons or property caused by such breaks or due to his own neglect in reporting and/or repairing such damages.

C. The Owner or Engineer will not be liable for any claims made by the Contractor based on underground obstructions being different than that indicated on the Plans. The Contractor shall uncover subsurface obstructions in advance of construction so that the method of avoiding same may be determined before the work reaches the obstruction.

1.07 DREDGING

A. The Contractor shall use a barge mounted hydraulic excavator or a long-reach hydraulic excavator to perform dredging operations. Dragline, clamshell bucket, or hydraulic dredging will not be allowed. The Contractor shall erect gunderbooms or turbidity curtains around his dredging operations. If the navigation of the water body is blocked or disrupted by the location of the gunderboom or turbidity curtains, the Contractor shall provide workmen to lower and raise the gunderboom or turbidity curtains allowing navigation along the water body. The Contractor shall not stop navigation along the

water body for more that twenty minutes without permission from the Engineer or Owner.

2.0 PRODUCTS

2.01 MATERIALS

A. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M145, soil classification Groups A-1, A-2, A-3, A-4, A-5, A-6, and A-7 inclusive with a liquid limit (LL) less than or equal to 50 and a plastic index (PI) less than or equal to 25.

B. Unsatisfactory soil materials are those defined in AASHTO M145 soil classification Groups A-2-5, A-2-6, A-2-7, A-5, A-6 and A-7 inclusive with a liquid limit (LL) greater than 50 and/or a plastic index (PI) greater than 25 and A-8, such as peat and other highly organic soils.

3.0 EXECUTION

3.01 SITE PREPARATION

A. The site shall be cleared of all unnecessary materials and debris. All pavement indicated shall be removed. In addition, subgrades for fills and embankments shall be cleaned and stripped of all surface vegetation, sod, and organic topsoil. All waste material shall be removed from the site and disposed of properly by and at the expense of the Contractor. Site preparation shall be in conformance with Section 31 11 00 - Site Preparation, Section 02 41 19 – Selective Structure Demolition, and Section 02 41 13 - Selective Demolition.

3.02 STABILITY OF EXCAVATION

A. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

B. Shoring and Bracing:

1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

2. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

C. Bench all slopes with greater than 3:1 slope.

3.03 EXCAVATION

A. Excavation work shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards. Excavation shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of formwork if required. In no case shall excavation faces be under cut for extended footings.

B. If the Engineer determines that there are areas of unsuitable material (muck, soft clays, organic material, etc.) which would prevent the placement and compaction of embankment, the unsuitable material shall be removed, measured and paid as excavation.

C. Stripping of topsoil shall be classified as excavation. Adequate amounts of topsoil shall be stockpiled for later use in seeding and fertilizing operations as required in Section 32 92 19. Any additional topsoil shall be considered as excess soil and disposed as required in this section.

D. Excavation of unsuitable material areas shall be performed in a manner acceptable to the Engineer that will not permit the entrapment of unsuitable material within the backfill. After the removal of unsuitable material, the Contractor shall take all elevations and measurements necessary to determine the volume of unsuitable material removed. The area excavated due to unsuitable materials shall be backfilled with suitable soil materials and compacted as required in Section 31 23 23. Backfill shall be placed in areas of excavated unsuitable material so that any soft material shall be pushed ahead of the backfill and removed. The Engineer shall determine the limits and depths of excavation of unsuitable materials

E. Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

F. The Contractor shall assume all responsibility for the stability and adequacy of cofferdams and dewatering systems constructed by him and all costs of damages resulting from any failure thereof.

G. Regardless of method of construction used, the structure(s) shall be plumb and in proper horizontal location. The Engineer's acceptance of procedures shall not relieve the Contractor of any responsibility for completion of the work in accordance with the drawings and Specifications.

H. Trench excavation shall be to the uniform width and depth required for the particular item to be installed as shown on the plans.

I. Excavation in excess of that authorized, as well as slides extending beyond the slope lines, shall not be paid for unless due to causes beyond the control of the Contractor. In all cases, surplus material from slides shall be removed and the slope reformed.

3.04 DEWATERING

A. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soils changes detrimental to stability of

subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

B. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

C. The water level within the excavations shall be continuously maintained at a level which will provide a stable subgrade until completion of the embankment to a point two feet (2') above natural groundwater. Structural concrete shall not be placed in water. The dewatering system shall prevent loss of foundation material and shall have reliable stand-by equipment and power supply.

3.05 REMOVAL OF COFFERDAMS AND BRACING

A. At the option of the Contractor after construction is complete, the cofferdams shall be removed unless the Engineer authorizes in writing that they remain; however, all temporary construction shall be removed at all locations within three feet (3') of natural ground elevation.

3.06 DISPOSAL OF EXCESS SOIL

A. The Contractor shall dispose of excavated material off site or on the site as directed by the Engineer. The exact location and quantity of material to be stockpiled on site shall be determined at the time of construction by the Owner.

B. Any excess material, not required for this project and not stockpiled, shall be hauled from the site and delivered by the Contractor to a legal storage area off site. Excess material shall become the property of the Contractor and shall be disposed of properly.

C. All unsuitable material excavated shall be hauled from the site and disposed of legally and properly as directed by the Engineer.

D. The Contractor shall provide at his own expense disposal areas and submit written permission from the property owner of the disposal site.

E. The Contractor shall be responsible for providing adequate topsoil material suitable for seeding to establish the finish grade on the site.

3.07 GRADING

A. Uniformly grade areas within limits of grading indicated on the drawings, including adjacent transition areas to produce a smooth, uniform, finished surface.

1. Construction shall conform to the survey stakes as set by the Engineer and to the section, slope and dimensions shown on the plans.

2. The subgrade finish tolerance shall be within 0.1 foot of the elevation shown on the plans.

3. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

B. Grade areas adjacent to building lines to drain away from structures and to prevent ponding. All surfaces shall be shaped to prevent the ponding of water. Finished surfaces shall be free from irregular surface changes.

C. Dredging tolerance is defined to be any dredging which is within three inches (3”) above or nine inches (9”) below the dimensions and elevations shown on the contract drawings. Any material removed in excess of the required dimensions will not be measured for payment. The Contractor shall be responsible for damages caused by excessive dredging.

3.08 MATERIAL STORAGE

A. Locate and retain soil materials away from edge of excavations.

B. Dispose of excess soil material and waste interior as herein specified.

3.09 MAINTENANCE:

A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

2. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

END OF SECTION 31 23 16

SECTION 31 35 00

SLOPE PROTECTION

1.0 GENERAL

1.01 RELATED WORK

A. Section 31 10 00 - Site Clearing

B. Section 31 23 16 - Excavation

C. Section 31 23 23 - Embankment and Backfill

1.01 DESCRIPTION

A. The Contractor shall provide all labor, materials and equipment for the placement of riprap to the grades as indicated on the Plans.

B. Placement of riprap shall not begin until the work to be covered has been inspected and approved by the Engineer.

C. The Contractor shall provide all labor, materials and equipment for the placement of concrete for slope paved ditches and concrete flumes to the lines and grades as indicated on the Plans.

D. The Contractor shall provide all labor, materials and equipment for the construction of silt fence ditch checks at the locations and to the lines and grades as indicated on the Plans.

2.0 PRODUCTS

2.01 RIPRAP

A. The contractor shall furnish any one of the following types of riprap material from the State of Louisiana Department of Transportation and Development Qualified Products List 2 or the USACE MVD Stone Protection Source List. This material shall consist of 100 percent stone (limestone).

B. Riprap shall consist of stone that will not disintegrate upon exposure to the elements or be easily broken from handling, and shall be reasonably free from earth and other foreign materials. Stone for riprap shall consist of field stone or rough unhewn quarry stone nearly rectangular in section as is practical. Sound pieces of broken concrete of proper size and weight will be acceptable as stone for riprap, but only one type of riprap may be used on the project. This riprap shall comply with material and gradation requirements of Class 55 LB. Riprap per table: 31 35 00.1:

Table 31 35 00.1

Riprap Class[1]	Stone Size lb (kg)	Spherical Diameter ft(mm)[2]	Percent of Stone Smaller Than
55 lb (25 kg)[3]	275 (125)	1.50 (460)	100
	110 (50)	1.11 (335)	42-100
	55 (25)	0.88 (270)	15-50
	20 (9)	0.63 (190)	0-15

[1] The stone size used to define the Riprap Class is the minimum median stone size for the stone class. The minimum thickness of a riprap layer shall be no less than the spherical diameter of the maximum stone size in the Riprap Class.
[2] Spherical Diameter based on a solid weight of 155lb/cu ft (2490 kg/cu m).
[3] Recycled portland cement concrete may not be used in these riprap classes.

B. Control of the gradation of the various classes of riprap will be by visual inspection either at the source or the project site at the Engineer's option. Any difference of opinion between the Engineer and the Contractor shall be resolved by checking 2 random truckloads (or equivalent size sample) in accordance with the method provided in AASHTO T 85 with all the equipment, labor, and sorting site for this check being provided by the Contractor at his expense.

C. Material shall be produced from sound durable rock with a specific gravity of at least 2.50. Percentage of wear (L.A. Abrasion) not greater than 50% (AASHTO T 96). The material shall be free of cracks, soft seams, or other structural defects. The pieces shall be roughly angular and shall be reasonably free from thin, flat or elongated pieces. Riprap shall be reasonably free of dust and fines.

2.02 GEOTEXTILE FABRIC

A. Geotextile Fabric shall consist of a non woven fabric composed of at least 85% by weight of polyolefins, polyesters, or polyamides. The geotextile fabric shall be resistant to chemical attack, rot, and mildew and shall have no tears or defects which adversely alter its physical properties. The geotextile shall be resistant to abrasion from the movement of adjacent roadbed material and aggregate.

B. The geotextile shall be provided in rolls wrapped with protective covering. Each roll of fabric shall be wrapped individually and the protective covering shall be adequate for long or short term storage. A tag or other method of identification shall be attached to each wrapped roll of fabric indicating the following:

1. Manufacturer's name and address.
2. Date of manufacture of fabric.
3. Manufacturer's order number.
4. Number or symbol of manufacturer's production run.
5. Customer order number.
6. Weight per sq. yd. of fabric.
7. Width of roll.
8. Length of roll.

C. Compliance, Inspection and Sampling Requirements

1. A competent laboratory must be maintained by the producer of the geotextile at the point of manufacture to insure quality control in accordance with ASTM testing procedures. That laboratory shall maintain records of its quality control results and provide said results to the Engineer upon request.

2. The certification shall be based on average roll minimum values and shall include the following:

   a. Name of manufacturer
   b. Chemical composition.
   c. Product description
   d. Statement of compliance to specification requirements.
   e. Signature of legally authorized official attesting to the information required.
   f. Purchaser.

D. Geotextile fabric shall meet the following minimum requirements:

AOS , US Sieve, Min.	50 - 70	ASTM-D-4751
Grab Tensile, Pound, Min.	130 - 180	ASTM-D-4632
Percent Elongation @ Failure, Min.	60	ASTM-D-4632
Burst Strength, PSI, Min.	220	ASTM-D-3787
Puncture, Pound, Min.	60	ASTM-D-4833
Trapezoidal Tear Strength, Pound, Min.	60	ASTM-D-4533
Coefficient of Normal Permeability (Cm/sec)	0.1	ASTM-D-4491
Permittivity, Per Second, Min.	0.20	ASTM-D-4491
Strength Retained at 150 h Weatherometer, Percent, Min.	70	ASTM-D-4632
Weight (Oz. per Square Yard)	5	

E. The average roll minimum value (weakest principle direction) for strength properties of any roll tested from the manufacturing lot or lots or particular shipment shall be in excess of the average roll minimum value (weakest principle direction) stipulated.

F. The geotextile shall be tinted or otherwise treated to prevent the occurrence of snowblindness of handling personnel.

2.03 SILT FENCE DITCH CHECK

A. Geotextile Filter Fabric for silt fences shall meet the requirements of AASHTO M 288. The geotextile fabric shall be resistant to chemical attack, rot, and mildew and shall have no tears or defects which adversely alter its physical properties. Geotextile fabric shall meet the following minimum requirements:

AOS , US Sieve, Min.	20	ASTM-D-4751
Grab Tensile, Pound, Min.	90	ASTM-D-4632
Percent Elongation @ Failure, Min.	15-50	ASTM-D-4632
Permittivity,gal/min/ft.^{2}	15	ASTM-D-4491
Ultraviolet Stability (%)	80	ASTM-D-4355

Strength Retained at 500 h Weatherometer, Percent, Min.	70	ASTM-D-4632

B. Woven Wire Fence shall be No. 9 farm fence, design 1047-6-9, having either a Class 2 Zinc Coating conforming to the requirements of ASTM A 116 or a Class 2 Aluminum Coating conforming to the requirements of ASTM A 584.

C. Posts for silt fence ditch check shall be either wood or steel installed a minimum of 2 feet in the ground. Posts shall provide a sufficient length for attaching wire fabric and embedding in soil such that fence will be adequate to handle stress from sediment loading.

D. Hay bales may be either hay or straw containing five (5) cubic feet of material and weighing not less than 35 pounds

3.0 EXECUTION

3.01 PLACEMENT OF RIPRAP

A. Prior to placement, subgrade or existing ground surface shall be excavated or regraded to conform with slopes and elevations specified in the plans. Any existing washes, ruts, or voids shall be filled and compacted to provide a uniform placement surface.

B. Engineer shall approve graded area for placement of riprap prior to beginning work.

C. The geotextile shall be unrolled as smoothly as possible on the prepared subgrade in the direction of construction traffic. Geotextile rolls shall be overlapped in the direction of the subbase placement. The geotextile shall be overlapped a minimum of one foot for separation applications. The riprap shall be carefully deposited on the geotextile fabric.

D. Material shall be placed so that random sized pieces are evenly distributed and “pockets” of excessively small or large material are avoided. The Engineer shall require redistribution of the material if necessary.

C. Riprap shall be placed in ditches at the locations and to the lines grades and thickness as noted on the drawings and as directed by the Engineer. Material layer thickness shall be uniform, and follow the plan lines as closely as possible. Thickness tolerances will be 3 ± inches. This may be altered at the discretion of the Engineer to account for material size variations.

3.02 SILT FENCE DITCH CHECK

A. Silt fence ditch checks consist of a woven wire fabric, mounted on posts, with a geotextile filter attached to the fence fabric. Fence height shall be as specified by the Engineer, but in no case shall exceed 36 inches above ground surface.

B. The contractor shall install temporary silt fence ditch checks as shown on the plans, and at other locations as directed by the Engineer. Fence Construction shall be adequate to handle the stress from sediment loading.

C. At the bottom of the fence, the geotextile fabric shall be buried a minimum of 6 inches in a trench so that no flow can pass under the barrier. The trench shall be backfilled and the soil compacted over the geotextile. The geotextile shall be spliced together only at a support post with a minimum of 6 inches overlap. Splices shall be made in accordance with the fabric manufacturer's recommendations.

D. The wire mesh shall be fastened securely to the upslope side of the post. The wire shall extend into the trench a minimum of 2 inches and extend a maximum of 36 inches above the original ground surface.

E. Silt fences shall be continuous and transverse to the flow, and limited to handle an area equivalent to 1000 square feet per 10 feet of fence.

3.03 MAINTENANCE

A. The Contractor shall maintain the integrity of silt fences as long as they are necessary to control sediment runoff. Should the silt fence become damaged or otherwise ineffective while the barrier is still necessary, it shall be repaired promptly with a new section of geotextile filter fabric overlapping 12 inches on each side of a break.

B. The Contractor shall inspect all temporary silt fences immediately after each rainfall and at least daily during prolonged rainfall. Any deficiencies shall be immediately corrected by the Contractor.

C. The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness. Where deficiencies exist, additional silt fences shall be installed as directed by the Engineer.

D. Sediment deposits shall be either removed when the deposits reach approximately one-half the height of the silt fence or a second silt fence shall be installed as directed by the Engineer.

E. Hay bales shall be securely anchored by the use of stakes and wire or other approved methods.

F. The silt fences shall remain in place until the engineer directs that it be removed. Upon removal, the Contractor shall remove and dispose of any silt accumulations, dress the area to give a pleasing appearance, and vegetate all bare areas in accordance with the contract requirements.

END OF SECTION 31 35 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 92 19

SEEDING AND FERTILIZING

1.0 GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all labor and materials necessary for preparation of seedbeds, mulching, furnishing, and sowing grass seeds, furnishing and applying commercial fertilizer and water, and maintenance on all vegetated areas disturbed by construction activities, specific areas designated on the Contract Drawings, or as directed by the Engineer and as specified herein.

1.02 RELATED WORK

A. Section 31 23 16 - Excavation

B. Section 31 23 23 – Embankment and Backfill

1.03 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.05 SUBMITTALS

A. Submit manufacturer's product data sheets, technical data, and application instructions as required in Section 01 33 00.

1.06 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.07 MAINTENANCE DATA

A. Submit maintenance data for continuing Owner maintenance under provisions of Section 01 77 00.

B. Include maintenance instructions, cutting method, and maximum grass height, types, application frequency, and recommended coverage of fertilizer and herbicide for controlling weeds.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01 60 00.

B. Store and protect products under provisions of Section 01 66 00.

C. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

D. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.09 MAINTENANCE SERVICE

A. Maintain and water seeded areas immediately after placement until grass is well established and exhibits and vigorous growing condition. Provide a minimum of three cuttings. Provide maintenance for six months after the Date of Substantial Completion or longer until grass is accepted.

2.0 PRODUCTS

2.01 SEED MIXTURE

A. Seed Mixture:

1. Grass Seed Mix A (between March and September): Shall be Bermuda grass (Cynodon dactylon) (Hulled) minimum 83% by weight of pure live seed, maximum 1% by weight weed seed. Seed shall be labeled in accordance with the latest U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act.

2. Grass Seed Mix B (between February and March): Shall be 44.5 percent (44.5%) Bermuda grass (Cynodon dactylon) (Hulled) minimum 83% by weight of pure live seed, maximum 1% by weight weed seed and 55.5 percent (55.5%) crimson clover minimum 78% by weight of pure live seed, maximum 1% by weight weed seed. Seed shall be labeled in accordance with the latest U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act.

3. Grass Seed Mix C (between September and March): Shall be 55.5 percent (55.5%) Fescue Hybrid (acceptable hybrids are 'Jaguar' 'Rebel' or 'Adventure') minimum 80% by weight of pure live seed, maximum 1% by weight weed seed, and 44.5 percent (44.5%) Bermuda Grass (Cynodon dactylon) (Non-Hulled) minimum 80% by weight of pure live seed, maximum 1% by weight weed seed. Seeds shall be labeled in

accordance with the latest U.S. Department of Agriculture Rules and Regulation under the Federal Seed Act.

4. Grass Seed Mix D (between September and February): Shall be 66.7 percent (66.7%) crimson clover minimum 78% by weight of pure live seed, maximum 1% by weight weed seed and 33.3 percent (33.3%) Bermuda Grass (Cynodon dactylon) (Non-Hulled) minimum 80% by weight of pure live seed, maximum 1% by weight weed seed. Seeds shall be labeled in accordance with the latest U.S. Department of Agriculture Rules and Regulation under the Federal Seed Act.

5. Grass Seed Mix F (between February and March): Shall be 55.5 percent (55.5%) Balled clover minimum 80% by weight of pure live seed, maximum 1% by weight weed seed and 44.5 percent (44.5%) Bermuda Grass (Cynodon dactylon) (Non-Hulled) minimum 80% by weight of pure live seed, maximum 1% by weight weed seed. Seeds shall be labeled in accordance with the latest U.S. Department of Agriculture Rules and Regulation under the Federal Seed Act.

5. Grass Seed Mix G (between September and October): Shall be 66.7 percent (66.7%) Vetch (Common) minimum 80% by weight of pure live seed, maximum 1% by weight weed seed and 33.3 percent (33.3%) Bermuda Grass (Cynodon dactylon) (Non-Hulled) minimum 80% by weight of pure live seed, maximum 1% by weight weed seed. Seeds shall be labeled in accordance with the latest U.S. Department of Agriculture Rules and Regulation under the Federal Seed Act.

2.02 ACCESSORIES

A. Fertilizer: Type 8-8-8 meeting the requirements of Sections 718 and 1018 of the Louisiana Standard Specifications for Roads and Bridges.

B. Vegetative Mulch: Hay, straw, stem, or stalks conforming to the requirements of Sections 716 and 1018 of the Louisiana Standard Specifications for Roads and Bridges.

C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

3.0 <u>EXECUTION</u>

3.01 INSPECTION

A. The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of the time he intends to start inoculating and mixing seed or begin sowing seed and shall not proceed with such work until permission to do so has been given.

B. All ground preparation, incorporation of fertilizer, inoculation of seed, seed mixing, and other work preparatory to planting as well as the operation of sowing, covering, and rolling shall be done in the presence of the Inspector.

C. The Inspector shall verify that prepared soil base is ready to receive the work of this Section.

D. Beginning of installation means acceptance of existing site conditions.

3.02 GROUND PREPARATION

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

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

C. Ground preparation shall consist of cultivation of prepared subsoil grades by disking, harrowing, or plowing to a loose depth of four inches.

D. Stockpiled topsoil shall be spread on the cultivated grades to a minimum depth of four inches and then the area shall be disked or harrowed through the layer of topsoil and at least two inches into the subsoil.

E. If adequate topsoil is not available on the project site, the Contractor shall import topsoil to the site.

F. Excess stockpiled topsoil at the end of seeding and fertilizing operations shall be disposed of as excess soil as directed in Section 31 23 16.

3.03 FERTILIZING

A. Fertilizer shall be applied as specified in Section 718 of the Louisiana Standard Specifications for Roads and Bridges to provide a minimum of 120 pounds of nitrogen, 120 pounds of available phosphoric acid and 120 pounds of total potash per acre as computed from the nominal contents of fertilizing ingredients.

B. Apply fertilizer in accordance with manufacturer's instructions at a rate of 1500 lbs per acre.

C. Apply after smooth raking of topsoil and prior to roller compaction.

D. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

E. Lightly water to aid the dissipation of fertilizer.

3.04 SEEDING

A. Seed Mixture A shall be applied at a rate of 30 lbs. per acre. Seed Mixture B shall be applied at a rate of 45 lbs. per acre. Seed Mixture C shall be applied at a rate of 45 lbs. per acre. Seed Mixture D shall be applied at a rate of 60 lbs. per acre. Seed Mixture F shall be applied at a rate of 45 lbs. per acre. Seed Mixture G shall be applied at a rate of 60 lbs. per acre. Rake in lightly. Do not seed area in excess of that which can be mulched on same day. Apply same day finish grading is complete.

B. No operations involving seeding shall be undertaken when the weather conditions are unfavorable, such as high winds or rain. The Contractor shall obtain approval of the Engineer prior to undertaking any seeding operations.

C. Apply water with a fine spray immediately after each area has been seeded. Saturate to 4 inches of soil.

3.05 SEED PROTECTION

A. Immediately after the placement of seeding, the seeded area shall be mulched to protect the seedbed. Mulch shall be applied in conformance with Section 716 and 1018 of the Louisiana Standard Specifications for Roads and Bridges.

B. Protect seeded areas from foot and vehicular traffic by placing string, tape, temporary fencing, or barricade around area periphery. Maintain until grass is established.

C. During daylight hours water 3 times daily immediately after planting until 3 weeks after germination, then follow maintenance watering schedule shown in Part 3.07.

3.06 HYDRO-SEEDING

A. Contractor may hydro-seed with approval of the Engineer.

B. Hydro seeding shall consist of mixing and applying seed, fertilizer, water management gel, polyacrylamide tackifier, mycrorrhizal inoculum with wood fiber, and water. Seed and fertilizer shall be applied as specified herein.

C. Wood fiber shall be spread at a minimum rate of 535 pounds per acre. Wood fiber shall be in addition to vegetative mulch.

D. Contractor may include fertilizer and lime in the seed slurry for application during the hydro-seeding operation.

E. Mixing of materials for application with hydro-seeding equipment shall be performed in a tank with a built-in continuous agitation system that has sufficient operating capacity to produce a homogeneous mixture. The discharge system for hydro-seeding equipment shall apply the mixture at a continuous and uniform rate.

F. Contractor may use a dispersing agent if the additive is guaranteed to not affect germination.

G. Polyacrylamide tackifier shall not be used in rainy weather, when soil temperatures are below 41°F, or when the wind speed is above 20 miles per hour.

H. Contractor will protect hydro-seeded areas from pedestrian traffic, vehicles, and equipment until area is ready for mowing.

3.07 MAINTENANCE

A. The Contractor shall produce a dense, vigorous, well established lawn and shall maintain lawn areas until the Owner's acceptance of Substantial Completion.

B. Mow grass at regular intervals to maintain at a maximum height of 7 inches. Do not cut more than 1/2 of grass blade at any one mowing. At least 3 mowings shall be completed until work is accepted.

C. Water to prevent grass and soil from drying out. A minimum amount of water would be two, one inch applications of water or rain per week.

D. Roll surface to remove minor depressions or irregularities.

E. Immediately re-seed areas that show bare spots. An acceptable lawn is defined as a cover of living grass in which gaps larger than 4" do not occur.

F. Protected seeded areas with warning signs during maintenance period.

END OF SECTION 32 92 19

SECTION 33 45 00

SPEED REDUCERS FOR STORM WATER PUMPS

1.0 GENERAL

1.01 SUMMARY OF WORK INCLUDED

A. The work provided herein consists of furnishing, testing and installation of a right angle gear drive speed reducer and a horizontally offset parallel gear reducer for the 1,076 CFS vertical pump, complete with all accessories as specified herein.

B. Definitions and standard practices shall be as defined and set forth by the American Gear Manufacturers Association (AGMA).

C. The gear reducer drive set will be used to transmit the power from the diesel engine to the vertical pump as indicated on the drawings and specified herein. The drives shall be adequately designed and conservatively rated to provide a reliable, efficient, smooth, and quiet running gear assembly under all operating conditions. The unit shall be furnished complete in every respect, with all items of equipment ready for operation.

D. The right angle gear drive shall be a solid shaft, double reduction, spiral bevel primary, helical secondary stage, speed reducer with horizontal input shaft from the first stage gear reducer, vertical downward output shaft to the pump, dry well construction to prevent oil leakage, with thrust bearing and anti-reverse backstop, Lufkin Industries, Philadelphia Gear or Engineer approved equal, built to AGMA standards, and made to drive vertical drainage pumps.

E. The first stage parallel offset gear shall be single reduction parallel, horizontal offset shaft type, Lufkin Industries, Model SFQ2050HGS, Philadelphia Gear, Models 135 MHP1 or Engineer approved equal, built to AGMA standards, and made to drive vertical drainage pumps. The first stage parallel shaft gearbox shall have a torsional coupling mounted at the blind of the input shaft. The input shaft shall have a through bore for air supply to the clutch.

F. The gear arrangement shall be the product of a manufacturer, with a proven service record with this type and size of gear of not less than two (2) years of operation at 1200 hours per year, at a minimum of three-quarter (3/4) rate load as a pump driver.

G. The Contractor shall be responsible for the proper sizing of the gear which shall be furnished as an integral part of the pumping package.

1.02 RELATED WORK

A. SECTION 22 10 00 – VERTICAL PUMPS,-AXIAL-FLOW PROPELLER TYPE

B. SECTION 41 65 10 – DIESEL FUELED ENGINE PUMP DRIVE

C. SECTION 41 65 11 - PACKAGED GRID COOLERS

1.03 REFERENCES

A. ASTM - AMERICAN SOCIETY FOR TESTING MATERIALS

B. ASME - AMERICAN SOCIETY FOR MECHANICAL ENGINEERS

C. ANSI - AMERICAN NATIONAL STANDARDS INSTITUTE

D. AWWA - AMERICAN WATER WORKS ASSOCIATION

E. ASA - AMERICAN STANDARDS ASSOCIATION

1.04 SYSTEM PERFORMANCE

A. Horsepower Rating: The gear drive shall be capable of transmitting 100% of the maximum horsepower required by the pump at the highest head condition (Condition 4) on a continuous basis. A minimum service factor of 1.5 shall be used in the gear drive unit design at this horsepower rating.

B. Ratio: The overall reduction ratio shall be such as to properly match the engine speed with the pump speed. The maximum input or engine speed is 1000 RPM. The output speed shall be that required by the pump. The exact pump speed and gear ratio shall be determined by the Contractor through the pump machinery supplier.

C. Gear Efficiency: The gear drive shall have an overall efficiency of not less than 97%.

D. Torsional Vibrations and Critical Speeds: The diesel engine will drive the pump through the parallel offset horizontal gear and the spiral bevel right angle gear drive. The assembled pumping unit, consisting of engine, gear drives and pump, shall be free from critical speeds or harmful torsional vibrations at all speeds normally required to obtain the guaranteed conditions of head and capacity.

1.05 SUBMITTALS

A. All submittals shall comply with requirements of Section 01 33 00.

B. Submittal with Bid: The Contractor shall submit within 5 days after the bid opening dimensional outline drawings, catalog data and other information on the right angle gear drive which shall at least include the following:

1. Manufacturer and Model No. of each gear drive.
2. Gear Ratios
3. Horsepower rating at 1.5 service factor
4. Efficiency at rated horsepower
5. Thermal rating of gear drive at rated horsepower
6. Heat rejection to lube oil cooler
7. Type of lube oil cooler used, including design thermal loads, materials, dimensions, method of cooling, etc.
8. Type of lube oil system in gear drives
9. Lube oil operating pressure
10. Maximum allowable lube oil temperature

11. Type of gears, method of cutting and finishing, and finished Rockwell hardness.
12. Type of bearings and B-10 life rating.
13. Type of thrust bearing
14. Downthrust capacity of thrust bearing at B-10 life of 50,000 hrs.
15. Backstop manufacturer, model and type
16. Type of case
17. Weight of each complete gear assembly

C. Submittal After Contract Award. The Contractor shall submit for the Engineer's review, dimensional drawings, shop drawings and other technical information on the right angle gear drive and the parallel offset horizontal gear drive to verify compliance with the specifications and drawings, which shall at least include the following:

1. Final values of all data required in the bid submittal.
2. Dimensional drawings of the gear drive assembly, including bolt pattern of hold down flange, and material description of all components.
3. Certified statement of gear quality and Rockwell C hardness of finished gears.
4. Calculations for B-10 life of thrust bearing.
5. Details of backstop, load rating, lift off speed, material descriptions.
6. Details and material descriptions of lube oil system pressure gages, temperature gages, and pressure switch.
7. Details of remote lube oil cooler including dimensional drawings, material descriptions, heat load ratings, etc.
8. Details, dimensional drawings and material descriptions of the input shaft and output shaft couplings.
9. Operation and maintenance manuals including dimensional drawings, parts list, lubrication and maintenance requirements, disassembly and repair instructions, and operating instructions.

1.06 INSTALLATION, OPERATION AND MAINTENANCE DATA

A. Six (6) Bound Installation-Operation-Maintenance Manuals shall be furnished containing complete information relating to installation, operation, lubrication adjustment, routine and special maintenance, repair, etc., including drawings, parts lists, handling weights, and performance data.

B. These manuals shall have a hard cover, appropriately marked and titled, and shall be printed on durable high quality paper. Xerox reproduction of photographs will not be allowed.

C. The operation and maintenance manuals and parts lists shall be bound separately and shall be approximately 8-1/2 inches by 11 inches. Drawings incorporated in the manual and/or parts lists may be reduced to page size provided they are clear and easily legible, or 11" x 17" sheets may be folded into the manual to page size. Photographs and/or catalog cuts of components may be included for identification.

D. The Contractor shall furnish to the Engineer, prior to deliver, three (3) complete sets of operating and maintenance instructions and parts lists for all equipment and systems furnished. Each set of information shall be bound in a three ring loose leaf binder and submitted through the Engineer.

1.07 QUALITY ASSURANCE

A. The gear manufacturer shall conduct a full speed run of the gear before shipment in order to check the operation, balance, lubrication system, backstop device and noise level. The Engineer reserves the right to witness these tests. Ten (10) days notice of the tests shall be given to the Engineer.

1.08 SHIPPING AND PROTECTION

A. All openings shall be sealed with plastic caps, plugs or films. The gear drive and any accessories shall be mounted on a skid and boxed. The skid mounting and boxing shall be done in a manner which will prevent damage to the gear drive and any accessories during loading unloading, storage and subsequent handling. Weatherproof covers shall be provided to protect the gear reducer during shipment.

1.09 COORDINATION

A. The rotation of the gear drive reducer output shaft shall be determined by the design rotation of the engine and the required rotation of the pump and engine, and shall be chosen by the Contractor through the pumping unit supplier.

1.10 SPECIAL TOOLS

A. The gear manufacturer shall furnish all "special" tools required to completely assemble, disassemble or maintain the gear reducer. "Special" tools are any grossly oversized or specially dimensioned tools of any kind, any special attachments or fixtures, or any other similar items.

2.0 PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Housing: The housing shall be of close grained cast iron, cast steel, ductile iron or fabricated steel and reinforced to carry all loads and to maintain gear alignment. A sole plate shall be provided under the reducer. Welded fabrications shall be heat treat stress relieved before any machining. The housing shall be so constructed as to provide rigid stability that maintains precise alignment of gears and shafts. The housing shall be of the enclosed case type construction with a breather and shall have adequate inspection and clean out ports or hand holes. Lifting lugs shall be provided. Flanged and screwed connections shall be provided as required.

B. Gears: Right Angle Gears shall be spiral bevel type. Parallel shaft gearing shall be of the helical. All gear design shall be precision cut from alloy steel, carburized and hardened then precision hard cut, lapped or ground for optimum tooth contact. Each gear shall be statically and dynamically balanced. Maximum pitch line velocity shall be 6,000 f.p.m. Gear precision shall be AGMA Quality 12 or better, and surface hardness shall be 58 Rockwell C or higher. Final surface finish of gear teeth shall be 16 RMS or better. Gear stresses shall not exceed 80% of the gear yield strength for any overload, motor stall of engine overload condition.

C. Shafting: All shafting shall be of heat treated alloy steel, conservatively sized, with a precision ground surface for bearings and gears. Alloy steel bar or forgings shall be used on the pinion gear which shall be integral with the pinion shaft. Individual shafts and gearing shall be statically and dynamically balanced along the axial and radial axies to an amplitude of less than 0.001 inch.

D. Bearings: All bearings shall be anti-friction, ball or roller type, oil lubricated, and designed for a B-10 life of 100,000 hours based on the loads imposed at the highest operating load condition of the pump. The output shaft thrust bearing shall be double row tapered roller type thrust bearing, located above the final drive gear, and have a thrust rating capable of supporting the weight of the pump rotating elements plus the highest hydraulic thrust load produced by the pump at the highest head condition. The thrust bearing shall have a minimum B-10 life of 100,000 hours. Radial bearings reducers shall be antifriction type. Ball Bearing load ratings shall not be used.

E. Backstop: The vertical output shaft or intermediate shaft shall have a self-actuated anti-reverse backstop device mounted above the thrust bearing to prevent reverse rotation of the pump, gear, and engine during backflow. The torque produced by the pump during backflow shall be determined based on a discharge pool elevation of +6.5' NAVD88, a suction pool elevation of -5.0' NAVD88, and the pump thrust on back flow being a minimum of 80% of the thrust in the forward flow direction at the same pool-to-pool heads. A minimum service factor of 2.0 shall be used in the backstop unit design. In addition the backstop shall be suitable for continuous operation at an engine idle speed of 500 RPM. The backstop shall be of a type with centrifugal lift springs with the inner race rotating and the outer race stationary. The backstop shall be a Ringspann FXM model or equivalent. The backstop shall have the inner race rotating and the outer race stationary. The backstop shall operate at a temperature less than 160 degrees F under all operating conditions with an ambient temperature up to 100 degrees F. The backstop will be provided with a circulating oil lubrication system and shall have sufficient flow rate to provide the required backstop cooling. Torque shall be transmitted directly to the gear housing and not through the gear train. The speed reducer shall be designed to withstand backstop failure and maximum pump runaway for a period of 30 minutes.

F. Cooling: If the transmitted horsepower exceeds the thermal rating of gear drive unit, and externally mounted water cooled heat exchanger shall be provided with the unit sufficiently sized to accommodate the excessive heat load under the worst operating conditions. The gear shall be designed to operate at an ambient temperature of 95° F. The heat exchanger shall be cooled by the engine's raw water cooled grid cooler. The gear manufacturer shall coordinate all cooling requirements with the grid cooler manufacturer and engine manufacturer, through the pump supplier and general Contractor. The heat exchanger shall be a water-cooled shell and tube type made of 90-10 Copper Nickel Alloy. Heat exchanger plates shall be 316 corrosion resistant steel. Minimum tube thicknesses shall be 0.0598 inch (16 gauge) and shall be adequate for the specified pressure rating. 50/50 Water/ Ethylene Glycol shall be circulated through the tubes or plates and the design shall be such that tubes or plates can be cleaned.

G. Noise Level: Noise measured 3 feet from the gear case shall not exceed 85 decibels and shall be in accordance with AGMA 292.04.

H. Pre-lubrication: The gear drive shall be equipped with a complete self-contained lubrication system and a pre-lubrication system. The pre-lubrication system shall be

positive displacement, driven by an electric motor drive. The electric motor-driven pump shall deliver sufficient pressure to the thrust bearing runner from the shoes and shall operate in manual and automatic modes. In the automatic mode, the pre-lubrication pump shall supply oil prior to reducer start-up and continue lubrication at least 30 seconds after start-up. In the manual mode, the pre-lubrication pump shall be started and stopped from a local control station mounted on the engine control panel. The pump and control available power will be 480 volt, 3 Phase, 60 Hertz and 24 volt (DC). The pump shall utilize zero-leakage check valves to isolate it from the lubrication system during operation of the reducer. No valve operation shall be required to execute the pre-lubrication cycle or return it to normal lubrication. Forced feed lubrication shall be provided for the gear meshes, bearings, backstop and all other moving parts of the reducer (except when submerged in oil) by a positive displacement, gear type, integrally mounted pump which shall be gear driven from the output shaft assembly of the gear. The lubrication system shall include an oil filter; pressure relief valve; and oil pressure and temperature gauges at the gear. Oil pressure and temperature gages shall also be provided to monitor the status of the lubrication system from the engine control panel. In addition, an oil pressure switch and temperature switch shall be provided to alarm and shut down the engine in the event of loss of oil pressure or high oil temperature in the gear drive. Contractor shall coordinate through the pump manufactured the required flow capacity required to cool the gear should remote radiator cooling be required.

I. Lubrication: The gear drive shall be equipped with a complete self-contained lubrication system. Forced feed lubrication shall be provided for the gear meshes, bearings, backstop and all other moving parts of the reducer (except when submerged in oil) by a positive displacement, gear type, integrally mounted pump which shall be gear driven from the output shaft assembly of the gear. The lubrication system shall include an oil filter; pressure relief valve; and oil pressure and temperature gauges at the gear. Oil pressure and temperature gages shall also be provided to monitor the status of the lubrication system from the engine control panel. In addition, an oil pressure switch and temperature switch shall be provided to alarm and shut down the engine in the event of loss of oil pressure or high oil temperature in the gear drive. The cooling and lubrication system shall consist of oil circulating pump, oil to water heat exchanger, piping filters and controls. The maximum oil sump temperature at rated speed and load shall be 160 degrees F when cooled by an engine after-cooler/gear oil grid cooler circuit with a supply temperature of approximately 110 degrees F.

J. Oil and Breather Filters: The lubrication system shall have two oil filters on the gear pump discharge side. One filter shall be for removing particles and the other for water removal. The filter for particles shall have a Beta rating of B6 greater than 75 at 60 psi differential tested in accordance with ISO 16889. Each filter shall incorporate an oil-filled differential pressure gauge to indicate the pressure drop across the filter. The filter shall have an internal magnetic element. The water removal filter shall maintain a water content in the oil of no greater than 200 ppm. All filter assemblies shall be sized so the pressure drop across the filter is no greater than 4.0 psi. The particle filter shall be sized to avoid bypass at a start-up oil temperature of 80 degrees F. Filters shall have a bypass setting of 45 to 60 psi. The breather filter shall have a Beta rating of B6 greater than 75 and a desiccant chamber to remove water.

2.02 COUPLINGS

A. The parallel speed reducer shall be connected to the engine by a disconnect clutch and Centa Centax-SEC coupling or equal.

B. The right angle speed reducer shall be connected to the parallel speed reducer utilizing a Falk G32 or equal coupling arrangement.

C. The coupling between the speed reducer and the pump shall be a rigid flanged, spacer type, flat faced coupling with reamed holes and fitted bolts incorporating adjustment features. Split thrust collars and other necessary provisions shall be incorporated in the coupling design for transmitting the rotating element weight and hydraulic thrust to the gear thrust bearing. This coupling shall be forged steel ASTM A-668-CL-D and shall be selected by the Contractor through the pump manufacturer.

D. A rigid flanged coupling, without spacer, may be used if the downward movement of the impeller is not restricted by vanes in the FSI suction connection or the configuration of the pump bowl.

2.03 INSTRUMENTATION

A. Instrumentation for the reducers shall be supplied and installed as a complete working package, coordinated with the pump prime mover supplier. All electrical work shall conform to NFPA 70. Electrical enclosures shall be NEMA 250, Type 4. The speed reducer shall have the following devices as a minimum:

1) High oil temperature switch in unit sump.
   a) Alarm at 180 degrees F.
   b) Shut down prime mover at 200 degrees F.

2) Oil Pressure Gauge
   a) After Oil Pump
   b) Electric Motor-driven pre-lubrication pump.
   c) Gauges shall be oil or glycerine filled and shall have snubbers and isolation valves.

3) Thermometer
   a) Sump
   b) Oil line after heat exchanger
   c) Backstop

4) Oil Flow Switch
   a) Alarm at 80 percent of design flow
   b) Shut down prime mover at 60 percent of design flow

5) Vibration Switch – Alarm at 0.5 inch/sec or at baseline level recommended by the reducer manufacturer.

2.03 COUPLING AND KEYWAY FITS SHALL BE AS FOLLOWS:

DESCRIPTION	TYPE OF FIT	TOTAL INTERFERENCE OR CLEARANCE
GEAR BOX COUPLING HALVES FOR CONNECTION TO:		
Main Pump Shaft	Interference .0005 min.	.0015 max.
Gear and Clutch Shaft*	Interference	.002 max. .001 min.
KEY TO KEYWAY SIDEWAYS:		
(All)	Interference	.0015 max. .0010 min.
Key to Keyway - Top and Bottom (All)	Clearance	.010

*Subject to change (depending on coupling furnished).

2.04 FINISHES

A. The exterior of the gear drive shall have any grease, rust or scale cleaned from the surface and painted with a suitable anti-rust metal primer and two coats of the manufacturer's standard paint suited for a corrosive environment. Color to be selected by the Engineer.

B. All interior surfaces shall be thoroughly cleaned and coated in accordance with the manufacturer's standard procedure.

3.0 EXECUTION

A. SEE PUMP SECTION 22 10 00 FOR INSTALLATION REQUIREMENTS.

END OF SECTION

SECTION 41 65 10

DIESEL FUELED ENGINE PUMP DRIVE

1.0 GENERAL

1.01 SUMMARY OF WORK INCLUDED

A. The work provided herein consists of furnishing, testing, and installation of a diesel engines for the 1,076 CFS vertical pumps, complete with all auxiliaries and accessories.

B. The engine will be used to drive a vertical pump through a horizontally offset parallel gear and a right angle gear reducer as indicated on the drawings and specified herein. The engine shall be adequately designed and conservatively rated to provide a reliable, efficient and smooth power source under all operating conditions.

C. The engine shall be sized and furnished by the pump supplier as an integral part of the pumping system.

D. The engine shall be a 1000 rpm maximum, two stroke or four stroke cycle, water cooled, compression ignition diesel, turbocharged and after cooled or naturally aspirated, mechanical or electronic injection, compressed air started, vee-type or in-line 2700 horsepower. Caterpillar Model C280-6 EMD Model 12710G4C, or Engineer approved equal. Engine shall be EPA Tier 2 rated.

1.02 RELATED SECTIONS OF PUMP SYSTEM

A. SECTION 22 10 00- VERTICAL PUMPS,- AXIAL-FLOW PROPELLER TYPE

B. SECTION 33 45 00 – SPEED REDUCERS FOR STORM WATER PUMPS

C. SECTION 41 65 11 – PACKAGED GRID COOLERS

D. SECTION 22 10 01 - PUMP MODEL TEST

1.04 REFERENCES

A. ASTM

B. ASME

C. ANSI

D. AWWA

E. ASA

1.05 SYSTEM PERFORMANCE CHARACTERISTICS

A. Duty cycle shall be continuous

B. Engine Parameters

1. Horsepower. The engine shall be rated to meet all of the following requirements while operating inside of the pumping station building with interior conditions of 110° F and 29.6 in. Hg, and using No. 2 diesel fuel.

   a. The engine standard net continuous brake horsepower rating or Marine Continuous Rating, as defined by DEMA, shall not be less than 110% of that required to operate the pump at rated speed at the highest head condition (condition No. 4) for the pump specified in Section 22 10 00.

   b. The engine standard net intermittent brake horsepower rating shall be no less than 110% of the rated continuous horsepower and shall be available for two hours in any 24 consecutive hour period.

   c. The minimum engine net continuous brake horsepower rating, as defined by DEMA, shall be at least 2700 H.P.

   d. The engine shall produce sufficient net torque to overcome the rotational inertial of the entire pumping unit, the liquid inertia, and hydraulic friction, to accelerate the pumping unit from engine idle speed to full pump speed and establish flow across the discharge weir at elevation 5.25.

   e. The engine shall be EPA rated for Tier 2 emissions.

2. Engine Speed. The maximum rotating speed to obtain the above net horsepower ratings shall be 1000 RPM.

3. BMEP. The maximum brake mean effective pressure (BMEP) of the engine at maximum rated continuous brake horsepower shall be 295 psi.

4. The engine shall be capable of providing the power required at the engine output shaft in order to satisfy the maximum requirement of the complete pumping unit.

5. The assembled pumping unit, consisting of engine, clutch, drive shaft, gear reducers, and pump, shall be free from critical speeds or harmful torsional vibrations at all speeds normally required to obtain the guaranteed conditions of head and capacity. The engine manufacturer shall make a torsional critical speed analysis of the entire pumping unit consisting of pump, shafting, couplings, gear reducers, clutch, and engine over the entire operating range of the unit.

1.06 SHOP DRAWINGS AND DATA

A. The Contractor shall submit, within 10 days after the bid opening, the engine supplier's dimensional outline drawings, catalog data and other information as follows:

1. Make of Engine
2. Model No.
3. Number of Cylinders
4. Continuous H.P. Rating @____ RPM and Specified Ambient Conditions
5. Intermittent H.P. Rating @____RPM and Specified Ambient Conditions

6. Maximum H.P. Rating @ ____ RPM and Specified Ambient Conditions
7. RPM Maximum
8. Strokes per Cycle
9. Turbocharged or Naturally Aspirated
10. Bore and Stroke
11. Displacement (cu. in.)
12. Piston Speed
13. Maximum Torque (ft. lb.) @ ____ RPM
14. Compression Ratio
15. B.M.E.P. (p.s.i.) at Continuous H.P. Rating
16. Minimum Idling Speed RPM
17. Minimum Operating Speed
18. Minimum Load
19. Water Cooled Exhaust Manifold? (Yes) (No)
20. Total Weight
21. Dimensions - Length - Width - Height
22. Heat Rejection of Jacket Water BTU/min.
23. Heat Rejection Lube Oil Cooling Water BTU/min.
24. Heat Rejection Aftercooler Water BTU/min.
25. Heat Rejection Exhaust Manifold (if water cooled)
26. Total Heat Rejection to Cooling Water BTU/min.
27. Jacket Cooling Water GPM and Optimum Temp. In and Out
28. Lube Oil Cooler Water GPM and Optimum Temp. In and Out
29. Aftercooler Water GPM and Optimum Temp. In and Out
30. Total Cooling Water GPM and Optimum Temp. In and Out
31. Maximum Safe Jacket Water Temperature from Engine
32. Remote Grid Cooler - Model - Size - Heat Rejection.
33. Required Grid Cooler In and Out Temperature
34. Allowable Pressure Drop in External Grid Cooling System
35. Fuel Oil Consumption Lb./BHP/Hr. @ Continuous H.P.Rating
36. Lube Oil Consumption Gal. Hr. @ Continuous H.P. Rating.
37. Lube Oil Capacity
38. Lube Oil GPM Circulated and Optimum Temp. To and From Engine
39. Maximum Safe Operating Temperature of Lube Oil
40. Intake Air Volume CFM and Allowable Pressure Drop
41. Exhaust Temp. °F at Continuous H.P. Rating
42. Exhaust Volume CFM or Lb./Hr. and Allowable Pressure Drop
43. Pressure and Volume Required for Air Starting System
44. Exhaust Silencer - Residential - Pipe Size - Diameter - Length - Pressure Drop
45. Recommended Air Intake Filter
46. Type of Injector and Manufacturer
47. Type of Governor and Manufacturer
48. Engine Driven Accessories and Required H.P.
49. Engine Controls and Control Panel.
50. Clutch Manufacturer Model No. and H.P. Rating
51. Drive Shaft and Couplings
52. EPA emissions Tier rating.

B. The Contractor shall adhere to the pertinent paragraphs of the General Specifications, Special Specifications and Section 01 33 00 in regard to shop drawings, data, etc.

C. After the Contract Award, the Contractor shall submit, for the Engineer's review, dimensional outline drawings, shop drawings and other technical information on the engine to verify compliance with the specifications, this information shall at least include the following:

1. Final values of all data required in the Bid Submittal
2. Torsional data for pump manufacturer’s use in critical speed analysis
3. Skid anchor bolt details to the building slab.
4. Skid connection details for all interconnections of pipe, electrical, exhaust, etc. showing sizes, locations, flexible connections, and type connections at each point.
5. Certified engine test results.
6. Control Panel dimensional and schematic drawings, panel front layout, wiring diagrams and material descriptions.
7. Grid Cooler dimensional drawings and performance data showing piping connections, hold-down details, material descriptions, weights, electrical loads and power requirements, heat rejection valves and hydraulic losses thru radiator.
8. Calculations demonstrating engine torque is sufficient to accelerate pump to full speed and prime the discharge tubes in the allowed time.
9. Drive shaft dimensional drawing showing couplings, allowable deflections and misalignment, material, etc.
10. Operation and maintenance manual including final drawings, factory manuals, parts list for each device and operating instructions.
11. Recommended spare parts list for 2 years operation.

1.07 OPERATION AND MAINTENANCE DATA

A. Six (6) bound Installation-Maintenance manuals shall be furnished containing complete information relating to installation, operation, lubrication, adjustment, routine and special maintenance, repair, etc., including drawings, parts lists, handling weights, and performance data.

B. These manuals shall have a hard cover, appropriately marked and titled, and shall be printed on durable high quality paper. Xerox reproduction of photographs will not be allowed.

C. The operation and maintenance manual and parts lists shall be approximately 8-1/2 inches by 11 inches. Drawings incorporated in the manual and/or parts listed may be reduced to page size provided they are clear and easily legible, or 11" x 17" sheets may be folded into the manual to page size. Photographs and/or catalog cuts of components may be included for identification.

D. The Contractor shall furnish to the Engineer, prior to delivery, three (3) complete sets of operating maintenance instructions and parts list for all equipment and systems furnished. Each set of information shall be bound in a three ring loose leaf binder and submitted through the Engineer.

1.08 QUALIFICATIONS OF MANUFACTURER AND VENDOR

A. The engine must be a standard product of the manufacturer and have a proven service record of not less than two (2) years operating not less than 1200 hours per year at not

less than three quarter (3/4) rated load on pump driving service. The engine shall be offered only at the speed and rating for which it has been designed.

B. The engine shall be furnished by an authorized dealer of the manufacturer who has factory trained servicemen, a suitable stock of replacement parts, technical assistance and warranty administration capability, all located within 100 miles of the jobsite.

C. The engine manufacturer shall examine the space available for engine placement and shall arrange all engine accessory packages to fit in the allotted space.

1.09 DELIVERY STORAGE AND HANDLING

A. All openings shall be sealed with plastic caps, plugs or films. The engine's fabricated structural steel base will serve as a skid for loading, shipping and unloading. All auxiliaries and accessories not attached to engine shall be securely mounted on skids of ample size, and all small parts shall be boxed. The skid mounting and boxing shall be done in a manner which will prevent damage to the engine and its auxiliaries and accessories during loading, shipment, unloading, storage and subsequent handling. Weatherproof covers shall be provided to protect the engine and its auxiliaries and accessories during shipment.

B. The engine and accessories as specified shall be packaged and mounted on a structural steel base. However, the electric motor driven horizontal radiator and exhaust silencer shall be remotely located.

1.10 COORDINATION

A. Rotation of the engine shall be coordinated with the required rotation of the pump and the design rotation of the gear reducer. It is intended that the engine deliver power in only one direction and an anti-reverse backstop device will be installed in the gear as specified.

1.11 EXTRA MATERIALS

A. The engine manufacturer shall furnish all "special" tools required to completely assemble, disassemble or maintain the engine. "Special" tools are any grossly oversize or specially dimensioned tools of any kind, any special attachments or fixtures, or any other similar items.

2.0 <u>PRODUCTS</u>

2.01 AUXILIARY EQUIPMENT

A. Grid Cooler: The engine shall be provided with a remote raw water trough mounted Grid Cooler as specified in Section 41 65 10, including expansion tank, and all interconnecting piping, valves and flexible connectors as shown on the drawings and as required for proper operation of the engine.

B. Clutch: The 2700 horsepower engine shall be provided with an Eaton Airflex, engine flywheel mounted, dual clutch model 26CB525 (or equal). The clutch shall be air operated, constricting type power take-off to allow air-actuated

engagement/disengagement of the pump. The clutch shall be rated for 2700 horsepower at 1000 rpm and shall have a minimum service factor of 1.8. Unit shall be provided with #75 friction material (#142436EN dual) and drive bars and shall operate at a minimum 80 psi air pressure. Unit shall be provided with a ¾ RH Rotorseal with hose and coupling. Spider shall be custom bored and keyed.

C. Exhaust Silencer: The engine shall be furnished with Maxim M-32 or equal muffler, 18-inch size vertical mounted with side inlet, rated for residential sound levels. Inlet/outlet connections to have 18" ANSI 150# flange drilling for bolting.

2.02 DRIVE SHAFT AND COUPLINGS

A. Drive Shaft and Couplings shall be provided between the engine and each of the gear units.

B. The drive shaft shall be a one piece, solid steel drive shaft designed for compatibility with the torsional requirements of the pumping unit, without deflection or vibration.

C. A torque tube type drive shaft may be approved by the Engineer. The drive shaft shall be finished all over. When installed, the shaft runout at any point shall be less than 0.002" with the out of round less than 0.001". The drive shaft shall be supported by the engine clutch output shaft and the gear input shaft. The overhung loads imposed on the engine clutch and gear by the weight of the drive shaft and couplings plus any dynamic loads shall be less than the allowable overhung loads for the clutch and gear respectively. All guards for the shaft and couplings shall be furnished. In accordance with applicable O.S.H.A. Regulations.

D. Couplings shall be as specified in Section 33 45 00.

2.03 ENGINE COMPONENTS

A. All materials shall be new and conform to the standards of the American Society of Testing Materials where such standards are applicable.

B. The block shall be of one piece design and made of high tensile strength cast iron or welded steel which is stress relieved and machined.

C. Crankcase: Inspection access panels shall be provided through which main and connecting bearings can be checked and replaced.

D. Bearings: Main and connecting rod bearings shall be precision fit with no shimming required, with upper and lower removable shells with replaceable tri-metal or aluminum alloy inserts.

E. The Crankshaft shall be one piece forged steel with hardened wear surfaces, counterweighted, statically and dynamically balanced, with large thrust bearing and flange for connection to the flywheel.

F. The Connecting Rods should be one piece forged steel with removable and replaceable bearings and bushings.

G. The Pistons shall be cast iron or aluminum with cast iron ring bands, elliptically ground and oil cooled.

H. The Cylinder Liners shall be replaceable, full length wet type, cast iron, fully machined with induction hardened or chrome plated wear surfaces and precision honed.

I. Valves: All valves shall be readily accessible for maintenance purposes and have satellite faces and seats with replaceable hardened steel inserts.

J. Exhaust Manifold: Manifolds shall be either dry type with corrosion resistant steel heat shields or liquid cooled. A single exhaust outlet shall be provided with a flexible connection with flanged ends for connection to the exhaust piping. The flexible connector shall be stainless steel sized equal to the exhaust manifold diameter.

K. Turbocharger: Separate turbochargers shall be provided for each exhaust manifold with a single exhaust outlet. The turbocharger shall be single stage with replaceable impeller and shaft bearings.

L. Lubrication System: The engine shall be provided with a full pressure lubricating oil system including oil pumps, cooler, strainer, and filter to distribute oil to all moving parts of the engine. The oil circulating pump or pumps shall be high capacity gear type, positive displacement, gear driven from the engine crankshaft, and sized to deliver the full flow required for lubrication and cooling oil. The oil cooler shall be a shell and tube heat exchanger with copper or copper-nickel tubes and cast iron or steel shell of sufficient size to maintain the oil temperature within 15° F of the engine jacket water temperature at all loads. The cooler shall be provided with a temperature control valve, bypass relief valve and shall be mounted on the engine and piped into the engine lubrication system. A full flow replaceable cartridge type duplex, 10 micron oil filter shall be provided with a bypass valve integral with the filter base. The lube oil system shall be completely contained, piped and mounted on the engine skid complete with fill and drain line.

M. Cooling System: The engine cooling system shall be a closed circuit fresh water/ethylene glycol type, remote grid cooler cooled, with provisions for filling, draining, expansion and de-aeration, and sufficiently sized and controlled to maintain the engine at its rated jacket water temperature while operating at the rated continuous horsepower. The jacket water pump or pumps shall be centrifugal type, gear driven from the engine, with sufficient head and capacity to circulate coolant through the engine, lube oil cooler, after-cooler, and grid cooler without the need for auxiliary off-engine pumps. The cooling system shall contain a thermostatically controlled valve for controlling jacket water and after-cooler temperature. The engine jacket water temperature shall not exceed 185° F under all operating conditions. However, the Engineer will consider higher operating temperatures if the engine manufacturer can provide evidence that higher temperatures are published recommended operating temperatures for the engine and that similar engines are operating satisfactorily at these temperatures. The engine shall also be provided with a thermostatically controlled jacket water circulating heating system, 18 KW minimum rating, for 480 volt three phase service. The circulating heater shall have a ¾ horsepower, 40 GPM pump and shall be Kim Hotstart Model CL 31804 or approved equal.

N. The engine coolant shall be a 50% - 50% mixture of ethylene glycol and demineralized soft water and shall be inhibited to achieve a corrosion and scale resistant non-foaming solution with a final PH between 8.5 and 10.0. The ethylene glycol antifreeze and corrosion inhibitor shall both be commercial grades approved by the engine manufacturer, Nalcool 3000 and Nalco 2000, or commercial equivalent. The water shall have a chloride and sulfate content of 100 PPM or less, total dissolved solids content of 500 PPM or less; total hardness of 200 PPM or less and PH of 6.8 to 8.0.

O. Fuel System: The fuel system shall consist of a fuel filter, transfer pump, injection pumps, mechanical injectors, manual priming pump and flex-connectors at the supply/return lines from the day tank. The fuel shall be continuously filtered through a duplex 12 micron replaceable cartridge type filter assembly. The fuel transfer pump shall be capable of delivering the required amount of fuel from the remote main tank. Fuel return back to the primary tank will be pressurized to approx. 20 ft. of head. The transfer pump shall deliver fuel to individual injection pumps, one for each cylinder, which shall be camshaft driven and of variable displacement dependent on engine load. Suitable adjustments for timing and balancing of cylinder pressures shall be provided on the engine. Single orifice injector valves shall be used with nozzles spraying directly into the cylinders.

P. Starting: The engine shall be provided with an Ingersoll-Rand air starting motor with lubricator, strainer, silencer, and solenoid operated air supply valve operated from the engine control panel. Supply air for starting will be 250 PSI. If the starting system requires a lower pressure, the engine shall be supplied with an engine mounted pressure reducing valve, isolation valve, and inlet wye strainer. A hand operated barring device or suitable substitute shall be provided to turn the engine for inspection and maintenance. The exhaust air from the starting operation shall be discharged and routed under the operating floor.

Q. Air Intake Filter/Silencer: A dry element type air intake filter/silencer shall be furnished, engine mounted, with replaceable element, sufficiently sized for the full energy rated horsepower at the rated speed. Intake air shall be from inside the building where ambient temperatures can reach 95° F.

R. Speed Controller: A digital speed controller shall be provided, Woodward 723 PLUS or equal, to maintain speed regulation within $\pm$ 0.5% under all load conditions. The unit shall be programmed and configured for repeatable engine speed maintenance. The engine speed shall be capable of being changed during engine operation, by governor adjustment, between 80% and 110% of normal operating speed. As part of the governor control, an over-speed shut-down shall be provided which shall shut off fuel supply to the engine when the set speed is exceeded.

S. Torsional Damper: The engine shall be provided with a torsional vibration damper with a metal guard. The damper shall be sized in conjunction with the engine flywheel, to eliminate torsional vibration.

T. Guards: All exposed rotating and hot parts shall be guarded. All guards shall comply with the standards of the Occupational Health and Safety Administration.

2.04 CRANKCASE PRESSURE RELIEF VALVE

A. A Pressure Relief valve shall be provided in the crankcase. The crankcase shall be vented in accordance with the manufacturer's recommendations, except the engine exhaust shall not be used as the venting system.

B. The engine shall be provided with a crankcase filtration system that will eliminate contaminated crankcase emissions. The system shall utilize a high efficiency two stage filter of 0.3 microns to 1.0 micron to remove 90% of all emissions and oily waste. The unit shall be Racor Crankcase Filtration Systems or approved equal

2.05 ENGINE CONTROL PANEL

A. Each engine in addition to the standard engine mounted control panel shall be provided with a custom designed, stand alone, NEMA 12, totally enclosed, cabinet type, auxiliary control and instrument panel. The panel shall be mounted adjacent to the engine skid on a fabricated support, in an accessible and readable location. The panel and all engine instrumentation and control power shall be powered by a 24 volt DC system that includes batteries and a battery charger. The panel through its communication with the engine mounted controller shall contain all digital and analog instruments and controls required for proper and safe operation of the pumping unit including the items mentioned in this subsection:

B. The pumping unit shall be put into service and operated by one man from the auxiliary control panel, with a start-up sequence as follows:

1. Energize control panel by turning "Master Switch" on with green pilot light to indicate panel energized. Begin start-up sequence by pressing "Engine Start/Stop" switch.

2. Upon completion of engine pre-lube cycle, drainage pump lubrication cycle and all gear pre-lubrication cycles, the engine shall start.

3. Controls shall have provisions that will allow the operator to manually activate the air-operated clutch, and air operated raw water valve. The raw water valve controller and pneumatic clutch controller shall be manually operated by a 3-way pneumatic directional control valve. The valve shall be capable of withstanding 250 psi working pressures and shall have a minimum 3/8" NPT supply and cylinder air port. Valve bodies and operator housing shall be anodized aluminum. Spool shall be stainless steel. Seals shall be Buna N and all internal parts shall be cadmium plated or bronze. The basic 3-way valve shall be supplied with no spring return and shall be provided with a detent kit and lever operator to hold the spool in the selected position. The valve shall be Rexroth Type "D" Pilotair Directional Valve, or approved equal. The pneumatic clutch system and the raw water valve shall be supplied with a quick exhaust valve equal to Mead Fluid Dynamics, Model #1B QEV or approved equal. Exhaust valve shall be rated for pressure in the range of 30 – 125 psi., all ports shall be minimum ¼" and shall be capable of a minimum flow of 5 cfm.

4. The pneumatic engine pre-lube pump, electrically actuated pre-lube pumps on each of the gear drive units and the electrically actuated drainage pump lubricator shall

initiate automatically upon pump start but shall also have a hand, auto, off switch mounted on the auxiliary engine control panel.

C. Panel shall include the following provisions:

1. Control power disconnect with green pilot light.
2. Fused protection of control circuits, and all wiring to be in accordance with the National Electric Code. Wiring shall be THHN, a minimum of No. 12 AWG.
3. Relays shall be Square D Class 8501 type P or equal.
4. Terminal blocks shall be Square D Class 9080 type CA or equal with at least 10% spare terminals on all blocks.
5. All connections to devices outside the cabinet shall be wired to a set of terminals at one readily accessible location near the wiring exit point.
6. All wiring shall be grouped in straight horizontal or vertical harnessed assemblies, bound and cleated every 6-inches minimum. All wiring and terminal strips shall be labeled to conform with the wiring diagrams.
7. An alarm silence and lamp test push buttons.
8. A generalized alarm contact for remote indication of Alarm.
9. Label all instruments, meters, lamps, and controls with engraved laminated plastic nameplates with black letters on white background.
10. Gauges shall be liquid filled to dampen vibration.
11. Panel shall operate on 24 volt D.C. power.

D. Panel shall include a visual and audible alarm for engine shut down functions, with amber indicator light activating before the shut-down set point is reached, and red indicator light to indicate first out when shut-down set point is reached. Shut down shall be accomplished by the closing of the fuel solenoid valve and by the following functions:

1. Engine over-speed.
2. Low lubricating oil pressure
3. High lubricating oil temperature
4. High jacket water temperature
5. High after cooler water temperature

E. Panel shall be provided with the following instruments:

1. Engine running time meter calibrated in hours, minimum indication to 9,999 hours.
2. Digital electronic tachometer.
3. Pyrometer for reading exhausts temperature at turbocharger outlet.
4. Lubrication oil, pressure gage.
5. Lubricating oil, temperature gage.
6. Lubricating oil, differential pressure gage.
7. Fuel oil, pressure gage.
8. Fuel oil, differential pressure gage.
9. Jacket water, temperature gage.
10. After-cooler circuit, temperature gage
11. Air cleaner, differential pressure gage.
12. Instrument, pressure gage (0 to 100 psi).
13. Intake manifold, pressure gage.
13. Starting air, pressure gage (0 to 250 psi).

14. Pump vacuum, vacuum gauge (0 to 30” Hg).
15. Temperature gauge on jacket water & after cooler water inlet and outlet piping. (Ship loose for installation on off-skid piping)

F. All engine and control power shall be provided by a 24 volt DC battery system dedicated to each engine and engine controller. The battery, battery charger and battery rack system shall be sized and provided as part of the engine and control package by the engine manufacturer. The battery system shall have the following characteristics:

1. Provide a battery system as shown on the drawings. The battery system shall consist of batteries, battery chargers, equipment mounting racks, DC circuit breaker panel, bus connection plates, connection straps, accessories, all assembled and interconnected into an integral system suitable for 24V DC engine control power as shown on the drawings. Each system shall consist of 24VDC battery banks, charger/power supplies, connected to operate through a DC distribution panel with one an outgoing feeder to the engine control panel. All four (4) battery banks, chargers, shall be identical, i.e. same size, same manufacturer.

2. Provide a battery suitable for the requirements of the engine control panel and all external associated 24VDC control elements such as solenoid valves, actuators, etc. required to implement the control scheme. Batteries shall be single cell, 19 cells, nickel cadmium, pocket plate, type.
   a. Pocket plate type batteries: The nickel cadmium cell shall consist of two groups of plates, the positive plates containing nickel hydroxide, and the negative containing cadmium hydroxide. The active materials of the pocket plate battery shall be retained in pockets formed from steel strips double perforated. The pockets shall be mechanically linked together, cut to the size corresponding to the plate width, and compressed in the final plate dimension. This process shall lead to a plate which is mechanically very strong, but shall also retains it’s active material within the steel containment to promote conductivity and minimize electrode swelling. The plates shall be welded to a current carrying bus bar assembly. Separation between plates shall be provided by injection molded plastic separation grids, integrating both plate edge insulation and plate separation. Provide a large spacing between the positive and negative plates and a generous quantity of electrolyte between plates to ensure good electrolyte circulation, and gas dissipation.
   b. Electrolyte shall be a solution of potassium hydroxide and lithium hydroxide to give best performance, life, energy efficiency, and a wide temperature operating range.
   c. Temperature Operating Range: (20^0 F to 100^0 F)
   d. Terminal Pillars: Shall be welded to bus bars, manufactured from steel bar, threaded for bolting on connectors and nickel plated. The sealing between the cover and the terminal shall be provided by a compressed visco elastic sealing surface held in place by compression lock washers.
   e. Vent: Provide flame arresting flip-top vent for safe venting.
   f. Container: shall be translucent polypropylene. The lid and container shall be welded together by heat sealing creating a homogenous joint.
   g. Battery Type: The battery shall be designed for application where the battery is required to provide a reliable source of energy over relatively long discharge periods.
   h. Batteries shall have a 10 year full warranty and a 25 year overall warranty.

i. Manufacturer: The battery shall be ALCAD type L.

3. Battery Sizing:
   a. Batteries shall be located indoors in ambient air environment (20 degrees F to 100 degrees F), 95%RH.
   b. Battery capacity shall be calculated by the manufacturer, taking into account all loads, the engine control panel, and including those external to the engine control panel. For direct calculation, the battery is assumed to carry its steady state load for 4 hours.
   c. Sizing shall utilize a design factor of 1.0 times the calculated values and an aging factor of 1.25 times the calculated values. The combined sum of these calculations will provide the actual size of the battery bank. Sizing shall be performed using method IEEE 1115
   d. The battery cell shall have a minimum rating of 10.5 Amp for 4 hours.
   e. Battery sizing calculations shall be approved by the Engineer before acceptance.

4. Battery Charger:
   a. Provide a battery charger with DC output current capacity to match the requirements of the batteries provided.
   b. Ambient Conditions: (20^0 F -- 100^0 F) and 95% RH.
   c. Battery charger shall be capable of operation as a DC power supply without batteries.
   d. Forced Load Sharing: Chargers shall operate in parallel and share load to within 2% output current of each charger.
   e. Battery charger shall be full-wave rectifier type, microprocessor based utilizing silicon semiconductor devices. Charger shall maintain a float charge of 1.42V per cell and an equalizing charge of 1.51V per cell.
      1. AC Input: 120 VAC (+10% to - 12%), 60Hz (+/-5%)
      2. DC Output: 24VDC nominal. Rating shall be larger of that required by design calculation or 16 amps. Provide design calculation with submittal. Charger shall be continuously rated for 110% current at maximum equalize voltage at 50 ^{0} C. Output current shall be limited to 115 percent of rated output current, even down to short circuit of the DC output terminals.
      3. Voltage Regulation: +/- 0.25% under all line, load and temperature variations
      4. Electrical noise: 30mVrms/32dBrnC weighted maximum.
      5. Surge Withstand: IEEE-472
      6. Features:
         1% digital LED meter for VDC, ADC, timer hours, alarm settings.
         AC on light
         AC input (30KAIC) , DC output circuit breaker (10KAIC)
            Circuit breakers shall not be overloaded or actuated under any external circuit condition, including recharge of a fully discharged battery and short circuit of the output terminals.
         Float/Equalize selector switch with indicating lights
         Manual equalize timer (0-255 hours) with indicating lights
         AC line failure with equalize timer (0-255 hour) with indicating light.
         Self Diagnostics
         Local or remote voltage sense
         High DC voltage shutdown

Reverse polarity protection
Front panel controls can be disabled for security
MOV surge protection on input and output
Membrane front panel
Alarm assembly with local LED and summary relay for AC Fail, DC fail, High VDC, Low VAC, positive and negative ground fault.
Output filter
Battery eliminator filter for parallel connections
Ground Pad
Fungus proofing (tropicalization)

7. Charger shall be Alcad type AT10

5. Battery Racks & Accessories:
   a. Provide a 2 step rack, with capacity 20 cells per rack, for each battery system.
   b. The rack shall be manufactured as follows
      1. FRAMES: Steel members powder-coated with ANSI #61 gray acid-resistant epoxy paint (2 coated)
      2. RAILS: Galvanized steel channel, or angle iron, an powder-coated with ANSI #61 gray acid-resistant epoxy paint (2 coats)
      3. RAIL INSULATION: Plastic channel fastened by double-sided adhesive tape
   c. Secure battery rack such that it cannot overturn or be disrupted by lateral forces accompanying a seismic disturbance. Provide lead-plated copper inter-rack connectors and cell numbers with each rack.
   d. Spill Containment:
      1. Provide a separate containment system for each battery system to meet UBC code requirements. The spill containment system shall consist of a minimum of 4” high barrier to contain electrolyte spills with appropriate quantity of acid neutralizing mats. Barrier shall be constructed of steel & sealed to floor with anchoring hardware & Accuseal barrier sealant. The steel barrier shall have a 2 part polyurethane acid resistant (ASA 61 gray) finish to match frame.

2.06 FINISHES

A. The exterior of engine, steel base and accessories shall have any grease, rust or scale cleaned from the surface and painted with a suitable primer and two coats of the engine manufacturer's standard paint. Color to be selected by the Engineer. The engine shall be additionally coated and processed for storage of a minimum of 12 months at the jobsite.

3.0 EXECUTION

3.01 INSTALLATION

A. The engine's structural steel base shall be anchored to the concrete engine base as indicated on the drawings and grouted with non-shrink or epoxy grout. No type of vibration eliminator will be allowed between the engine and the concrete base. Engine base structure shall be a heavy weldment of plate and/or structural shapes. The top surface of the base structure shall be fully machined for meeting with the machined surface of engine crankcase through shims. If engine crank case and sub-base are

precision machined and bolted, base structure may be shimmed at concrete base and grouted after anchoring.

B. All shim material 0.030 of an inch thick or less shall be stainless steel.

C. The engine supplier shall furnish all factory approved lubricants, coolants and inhibitors necessary to operate the engine during start-up and for the first 10 hours of operation thereafter.

3.02 START-UP

A. The engine supplier shall provide the services of a factory authorized service representative during start-up to ensure the engines are installed and hooked-up properly, have the correct lubricants and fluids, all necessary adjustments and calibrations are made, and the engine, operates in accordance with the design conditions.

3.03 DEMONSTRATION

A. Each engine shall receive a standard factory performance test, which shall be of sufficient duration to verify the following:

1. Continuous horsepower rating of engine.
2. Intermittent horsepower rating of engine.
3. Maximum horsepower capability of engine.
4. Fuel consumption at all above load conditions.
5. Overspeed trip test for engine governor setting.

B. The above tests shall be made without stopping the engine between runs. Certified test results shall be supplied containing all recorded test data.

C. Engine manufacturer shall provide the services of a factory trained service representative to provide field demonstration and training for each component of the pump drive package. The Contractor shall provide at least 8 hours site training and demonstration.

END OF SECTION

SECTION 41 65 11

GRIDCOOLERS

1.0 GENERAL

1.01 SUMMARY OF WORK INCLUDED

A. The work provided herein consists of furnishing, testing and installation of five (5) sets of engineered gridcoolers for the diesel engine specified in Section 41 65 10 and speed reducers specified in Section 33 45 00.

B. The gridcoolers shall be a designed for placement in a reinforced concrete gridcooler basin which will provide a ½ mile per hour minimum raw water flow over each heat exchanger. The raw water gravity flow/ forced pump discharge will provide 12" flow depth when discharged through each 3'-3" wide trough.

C. The gridcooler shall be sized and furnished by the pump supplier as an integral part of the pump drive package under the overall supervision and responsibility of the Contractor. Gridcoolers shall be manufactured by R.W. Fernstrum & Company, Model No. DD20184W-ZE1S2 or equal for the four (4) coolers required for the after-cooler and gear oil cooler circuits and model D18135-Ze1S1 or equal for the engine jacket water cooler circuit.

1.02 RELATED WORK OF PUMP SYSTEM

A. SECTION 20 10 00 – VERTICAL PUMPS,-AXIAL-FLOW PROPELLER TYPE

B. SECTION 33 45 00 – SPEED REDUCER FOR STORM WATER PUMPS

C. SECTION 41 65 10 – DIESEL FUELED ENGINE PUMP DRIVE

1.04 REFERENCES

A. ASTM

B. ASME

C. ANSI

1.05 SYSTEM PERFORMANCE

A. The gridcooler shall be sized to cool the pump engine driver jacket water, oil cooler circuit, after-cooler circuit and gear oil cooler circuit using an 85°F raw water cooling media flowing past the cooler at 0.5 miles per hour velocity. The gridcooler shall be sized to cool each engine utilizing 50% ethylene/glycol solution in the engine and gear cooling circuits. Additionally, the gridcoolers shall be capable of permitting the diesel engine to complete a 15 minute warm up cycle with the engine de-clutched from the gear and pump without engine overheating and without raw water flow in the gridcooler troughs. During this warm-up cycle the gridcoolers will be submerged in 12 inches of water, but convectional cooling alone is available. Should a longer period of warm-up be

required (engine break-in), the intake level will be lowered by the adjacent pumps and raw water gravity flow will be established. During operations where the engine clutch is engaged, raw water will be directed from the discharge of the pump and provide water flow in the grid cooler trough at a minimum velocity of 0.5 miles per hour.

B. The engine shall have separate jacket water and after-cooler circuits to satisfy the cooling requirements of the proposed pump drive. The jacket water circuit will utilize a single grid cooler to reject the 21,394 BTU/MIN minimum heat from the jacket water circuit. The gridcooler for this circuit shall be capable of maintaining a jacket water supply temperature of no greater than 180 degrees F at a flow rate of approximately 386 GPM. Additionally the engine shall have a separate after-cooler circuit that will cool all rejected after-cooler heat and excess heat from the parallel and right angle reduction gears. The four (4) gridcoolers used to reject the heat from this circuit shall be piped two (2) in series and two (2) in parallel. The total heat rejected from this circuit is 47,494 BTU/MIN minimum and has an approximate flow rate of 317 GPM. The maximum supply water water temperature to the right angle gear shall be no greater than 105°F when leaving the gridcooler at the conditions described above. All heat rejection values are minimum, but the selected grid cooler shall be sized to reject the excess heat based on the published data of each piece of equipment that requires cooling.

1.07 SUBMITTALS

A. All submittals shall comply with requirements of Section 01 33 00.

B. Submittal: The Contractor shall submit after the bid opening dimensional outline drawings, catalog data and other information on the keel cooler which shall at least include the following:

1. Manufacturer and Model No.
2. Design pressure - PSIG
3. Cooling capacity - BTU/MIN
4. Coolant flow rate through the heat exchanger - GPM
5. Pressure drop through cooler at the flow rate mentioned above
6. Temperature of coolant into cooler - °F
7. Temperature of coolant out of cooler - °F
8. Tube material description grade, seamless or welded, etc.
9. Tube dimension and thickness
10. Number of tubes, rows, and passes
11. Design raw water temperature - °F
12. Size of inlet and outlet connections.
13. Assembled unit weight and dimensions
14. Provisions for cooling gear oil
15. Certified copy of hydrostatic test results
16. Operations and maintenance manual including dimensional drawings, parts list, maintenance requirements, and operating instructions

1.08 QUALITY ASSURANCE

A. The gridcooler shall be factory tested with all of the manufacturer's standard tests. The tubes and other components subjected to coolant pressure shall be hydrostatically tested to a minimum of 1.5 times the design pressure, but not to exceed 35 psi.

1.09 SHIPMENT HANDLING AND STORAGE

A. All openings shall be sealed with plastic caps, plugs or films. The heat exchanger and any accessories shall be mounted on a skid and boxed. The skid mounting and boxing shall be done in a manner that will prevent damage to the cooler and any accessories during loading unloading, storage, and subsequent handling. Weatherproof covers shall be provided to protect the coolers during shipment.

1.09 COORDINATION

A. The sizing of the gridcoolers shall be determined by the design requirements of the engine and gear oil coolers and shall be chosen and furnished by the pump supplier through the Contractor.

2.0 PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. The gridcooler heat exchanger shall be constructed from 90/10 copper nickel alloy 706. The units shall be of welded and silver brazed construction. Silver brazed joints shall be made with Braze 560 (Bag-7).

B. The tubing in the gridcooler shall be rectangular in shape with enhanced internal surfaces. The rectangular shape shall be 2 ½” high by ½” wide by 0.062” wall thickness. The tubes shall be arranged in two (2) banks stacked one above the other with a ½” space between the banks. Each bank of tubes shall have 24 tubes with ¾” spacing between each tube.

C. Tube banks shall be supported by intermediate support straps with provisions for bolting to the support structure. All bolting shall be done with stainless steel fasteners. Each supporting leg shall be isolated from the concrete with a ¼” neoprene gasket.

D. Headers shall be constructed of ¼” thick 90/10 copper nickel sheet welded together. The tubes shall be silver brazed into the header tube sheet. Each header shall have supported and shall have provisions for bolting to the basin structure. Each header shall be provided with two (2) drain plugs.

E. The inlet and outlet connections shall be flanged. Flanges shall be made of 90/10 copper nickel and shall be welded to the header. Flange gaskets shall be neoprene and shall be ¼” thick. All Flanges shall be provided with stainless steel flange studs.

3.0 EXECUTION

NOT USED

END OF SECTION

APPENDIX 1

METAL BUILDING SHOP DRAWINGS

CONSOLIDATED METAL RESOURCES

826 Park Street Suite 206, Castle Rock, CO 80109-1526

Phone: 303-688-1323   Fax: 303-688-1069

Builder/Contractor Responsibilities

Drawing Validity – These drawings, supporting structural calculations and design certification are based on the order documents as of the date of these drawings. These documents describe the material supplied by the manufacturer as of the date of these drawings. Any changes to the order documents after the date on these drawings may void these drawings, supporting structural calculations and design certification. The Builder/Contractor is responsible for notifying the building authority of all changes to the order documents which result in changes to the drawings, supporting structural calculations and design certification.

Builder Acceptance of Drawings – Approval of the manufacturer's drawings and design data affirms that the manufacturer has correctly interpreted and applied the requirements of the order documents and constitutes Builder/Contractor acceptance of the manufacturer's interpretations of the order documents and standard product specifications, including its design, fabrication and quality criteria standards and tolerances. (AISC code of standard practice Sept 86 Section 4.2.1)(Mar 05 Section 4.4.1)

Code Official Approval – It is the responsibility of the Builder/Contractor to ensure that all project plans and specifications comply with the applicable requirements of any governing building authority. The Builder/Contractor is responsible for securing all required approvals and permits from the appropriate agency as required.

Builder is responsible for State, Federal and OSHA safety compliance – The Builder/Contractor is responsible for applying and observing all pertinent safety rules and regulations and OSHA standards as applicable.

Building Erection – The Builder/Contractor is responsible for all erection of the steel and associated work in compliance with the Metal Building Manufacturers drawings. Temporary supports, such as temporary guys, braces, false work or other elements required for erection will be determined, furnished and installed by the erector (AISC Code of Standard Practice Sept 86 Section 7.9.1) (Mar 05 Section 7.10.3) (CSA/S16-09 Section 29).

Discrepancies – Where discrepancies exist between the Metal Building plans and plans for other trades, the Metal Building plans will govern. (AISC Code of Standard Practice Sept 86 Section 3.3) (Mar 05 Section 3.3)

Materials by Others – All interface and compatibility of any materials not furnished by the manufacturer are the responsibility of and to be coordinated by the Builder/Contractor or A/E firm. Unless specific design criteria concerning any interface between materials if furnished as a part of the order documents, the manufacturers assumptions will govern.

Correction of Errors – Normal erection operations include the correction of minor misfits by moderate amounts of reaming, chipping, welding or cutting and the drawing of elements into line through the use of drift pins. Errors which cannot be corrected by the foregoing means or which require major changes in the member configuration should be reported immediately to the owner and fabricator by the erector, to enable whoever is responsible either to correct the error or to approve the most efficient and economical method of correction to be used by others. (AISC Code of Standard Practice Sept 86 Section 7.12)(Mar 05 Section 7.14)

Modification of the Metal Building from Plans – The Metal Building supplied by the manufacturer has been designed according to the Building Code and specifications and the loads shown on this drawing. Modification of the building configuration, such as removing wall panels or braces, from that shown on these plans could affect the structural integrity of the building. The Metal Building Manufacturer or a Licensed Structural Engineer should be consulted prior to making any changes to the building configuration shown on these drawings. The Metal Building Manufacturer will assume no responsibility for any loads applied to the building not indicated on these drawings.

Safety Commitment
The Metal Building Manufacturer has a commitment to manufacture quality building components that can be safely erected. However, the safety commitment and job site practices of the erector are beyond the control of the building manufacturer. It is strongly recommended that safe working conditions and accident prevention is the top priority of any job site. Local, State and Federal safety and health standards, whether standard statutory or customary, should always be followed to help ensure worker safety. Make certain all employees know the safest and most productive way to erect a building. Emergency procedures should be known to all employees. Daily meetings highlighting safety procedures are also recommended. The use of hard hats, rubber sole shoes for roof work, proper equipment for handling material, and safety nets where applicable, are recommended. For purposes of determining lift requirements, no bundles supplied by the manufacturer will exceed 4000 lbs. For further information also reference the bill of materials for individual member weights of other structural members. If additional information is required contact the customer service department.

Foundation Design
The Metal Building Manufacturer is not responsible for the design, materials and workmanship of the foundation. Anchor rod plans prepared by the manufacturer are intended to show only location, diameter and projection of the anchor rods required to attach the Metal Building System to the foundation. It is the responsibility of the end customer to ensure that adequate provisions are made for specifying rod embedment, bearing values, tie rods and or other associated items embedded in the concrete foundation, as well as foundation design for the loads imposed by the Metal Building System, other imposed loads, and the bearing capacity of the soil and other conditions of the building site. (MBMA 06 Sections 3.2.2 and A3)

Shop Primed Steel
All structural members of the Metal Building System not fabricated of corrosion resistant material or protected by a corrosion resistant coating are painted with one coat of shop primer meeting the performance requirements of SSPC Paint Specification No. 15. All surfaces to receive shop primer are cleaned of loose rust, loose mill scale and other foreign matter by using, as a minimum, the hand tool cleaning method SSPC-SP2 (Steel Structures Painting Council) prior to painting. The coat of shop primer is intended to protect the steel framing for only a short period of exposure to ordinary atmospheric conditions. Shop Primed steel which is stored in the field pending erection should be kept free of the ground and so positioned as to minimize water-holding pockets, dust, mud and other contamination of the primer film. Repairs of damage to primed surfaces and/or removal of foreign material due to improper field storage or site conditions are not the responsibility of the manufacturer. The Manufacturer is not responsible for deterioration of the shop coat of primer or corrosion that may result from exposure to atmospheric and environmental conditions, nor the compatibility of the primer to any field applied coating. Minor abrasions to the shop coat (including galvanizing) caused by handling, loading, shipping unloading and erection after painting or galvanizing are unavoidable. Touch-up of these minor abrasions is the responsibility of the End Customer (MBMA 06 IV 4.2.4)

Dissimilar Materials
Never allow your roof to come in contact with, or water runoff from, any dissimilar metal including but not limited to: Copper and Arsenic Salts used in treated lumber, Calcium used in concrete, mortar and grout.

Debris Removal
Any foreign debris such as sawdust, dirt, animal droppings, etc. will cause corrosion of the roof, gutters, trim, etc. if left on building surfaces for a long enough time. The roof should be periodically inspected for such conditions and if found, they should be removed.

ENGINEERING DESIGN CRITERIA

Building Code	2009 IBC
Occupancy Category	Normal (Category II)
Roof Dead Load	
Superimposed	3.75 psf
Collateral	10.00 psf
(0.00 psf Ceiling 10.00 psf Other)	
Roof Live Load	20.00 psf no reduction
Wind	
Basic Wind Speed	140.00 mph
Wind Importance Factor (I)	1.00
Wind Exposure Category	D
Internal Pressure Coef (GCpi)	0.55/-0.55

Loads for components not provided by building manufacturer
Corner Areas (within 4.80' of corner) 68.10 psf pressure -85.00 psf suction
Other Areas 68.10 psf pressure -72.32 psf suction
These values are the maximum values required based on a 10 sq ft area.
Components with larger areas may have lower wind loads.

Seismic	
Seismic Importance Factor (Ie)	1.00
Seismic Design Category	B
Soil Site Class	D Stiff Soil
Ss	0.116 g Sds ..... 0.124 g
S1	0.049 g Sd1 ..... 0.078 g
Analysis Procedure	Equivalent Lateral Force
Column Line	All
Basic Force Resisting System	H
Response Modification Coefficient (R)	3.00
Seismic Response Coefficient (Cs)	0.04
Design Base Shear in kips (V)	2.41

Basic Structural System (from ASCE 7-05 Table 12.1-1)
H - Steel System not Specifically Detailed for Seismic Resistance

PROJECT NOTES

Material properties of steel bar, plate, and sheet used in the fabrication of built-up structural framing members conform to ASTM A529, ASTM A572, ASTM A1101 SS, or ASTM A1011 HSLAS with a minimum yield point of 50 ksi. Material properties of hot rolled structural shapes conform to ASTM A992, ASTM A529, or ASTM A572 with a minimum specified yield point of 50 ksi. Hot rolled angles, other than flange braces, conform to ASTM 36 minimum. Hollow structural shapes conform to ASTM A500 grade B, minimum yield point is 42 ksi for round HSS and 46 ksi for rectangular HSS. Material properties of cold-formed light gage steel members conform to grade 55, with a minimum yield point of 55 ksi. For Canada, material properties confirm to CAN/CSA G40.20/G40.21 or equivalent.

All bolted joints with A325N-09 Type 1 bolts are specified as snug-tightened joints in accordance with the Specification for Structural Joints Using ASTM A325 or A490 Bolts, June 30, 2004. Pretensioning methods, including turn-of-nut, calibrated wrench, twist off type tension control bolts or direct tension indicator are NOT required. Installation Inspection requirements for Snug Tight Bolts (Specification for Structural Joints Section 9.1) is suggested.

This project is designed using manufacture's standard serviceability standards. Generally this means that all stresses and deflections are within typical performance limits for normal occupancy and standard metal building products. If special requirements for deflections and vibrations must be adhered to, then they must be clearly stated in the contract documents.

The cutting or removal of girts shown on the erection drawings due to the addition of open areas, framed openings, or doors not shown may void all warranties and certifications supplied by manufacturer as they apply to this condition.

The manufacturer does not assume any responsibility for the erection nor field supervision of the structure and or any special inspections (including inspection of high strength bolts or field welds) as required during erection. The coordination and costs associated for setting up any Special Inspections are the responsibility of the Erector, Owner, Architect, or Engineer of Record.

'Bracing size' as noted on Engineering documents and Erection drawings denotes thread diameter for rod bracing and wire strand cable diameter for wire strand cable bracing.

Loads, as noted, are as given within order documents and are applied in general accordance with the applicable provisions of the model code and/or specification indicated. Neither the manufacturer nor the certifying engineer declares or attests that the loads as designated are proper for local provisions that may apply or for site specific parameters. The manufacturer's Engineer's certification is limited to design loads supplied by an Architect and/or engineer of record for the overall construction project.

All structural bracing and support are the responsibility of the contractor during field modifications.

Using 8 X 8 gutter with 6 x 6 downspouts, the roof drainage system has been designed using the method outlined in the MBMA Metal Building Systems Manual. Downspout locations have not been located on these drawings. The downspouts are to be placed on the building sidewalls at a spacing not to exceed 43 feet. Downspout spacing that does not exceed the maximum spacing will be in compliance with the building code. The gutter and downspout system as provided by the manufacturer is designed to accommodate 11 in/hr rainfall intensity as it corresponds to a 5 year recurrence interval.

Locate Downspouts As Shown on Contract Drawings
Submit Flashing Details

Drawing Index

Page	Description
F1	Anchor Rod
F2	Anchor Rod Details
F3	Reaction Drawings
E1	Cover Sheet
E2	Primary Steel BLDGA
E3	Roof Framing BLDGA
E4	Roof Sheeting
E5	Sidewall BLDGA WALLSWA
E6	Sidewall BLDGA WALLSWC
E7	Endwall BLDGA WALLEWB
E8	Endwall BLDGA WALLEWD
E9-E11	Main Frame Cross Sections
E12	Portal Frame Cross Section 13 FRAMELINEA-SWA
E13	Portal Frame Cross Section 22 FRAMELINEA-SWC
E14	Connection Detail
E15	Ice Trim

Revision	Date	Description	By	Ch'd
A	08/03/11	FOR APPROVAL	DCS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Customer: ASCENSION CONSOLIDATED 8300 LA. HWY 3140 SORRENTO, LA 70778
Project Name & Location: MARVIN BRAUND PUMP STATI 8300 LA. HWY 3140 SORRENTO LA 70778

Drawing Status: ☐ Preliminary Not for Construction ☒ For Approval Not for Construction ☐ For Construction Permit ☐ For Erection Installation

Scale:	NOT TO SCALE
Drawn by:	DCS 8/3/11
Checked by:	ART 8/5/11
Project Engineer:	AXW
Job Number:	22-T-05214-1
Sheet Number:	E1 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

BURK-KLEINPETER, INC.
ENGINEERS, ARCHITECTS, PLANNERS, ENVIRONMENTAL SCIENTISTS
4176 CANAL ST NEW ORLEANS, LA 70119

SHOP DRAWING REVIEW

☐ REVIEWED ☒ REVIEWED AS NOTED
☐ REJECTED ☐ REVISE & RESUBMIT

Review does not permit omission of any item not shown or any change whatever in plans, specifications and other contract documents. Contractor is responsible for all dimensions, quantities, co-ordination with other trades, proper fitting, construction work, furnishing of materials or work required but not indicated on these shop drawings, errors and omissions in these drawings, and full compliance with contract documents.

BY [signature] DATE: 10-17-11

SHOP DRAWING REVIEW
Review is for general compliance with contract documents. Review does not permit omission of any item required by or any deviation whatever from contract documents. Subcontractor/supplier remains responsible for:
(a) Full compliance with contract documents.
(b) Errors and omissions in the attached drawings or brochures.
(c) Incorrectly figured dimensions or quantities.

MAX FOOTE CONSTRUCTION CO., INC.
BIRMINGHAM, AL
☐ APPROVED
☒ APPROVED AS NOTED
☐ REVISE & RESUBMIT
☐ REJECTED

LOG # 23-13 34 19
BY RQ DATE 8/30/11

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

FOR APPROVAL
NOT FOR CONSTRUCTION
NOT FOR PERMIT
☐ Approved as submitted
☐ Approved as noted
☐ Disapproved / Resubmit

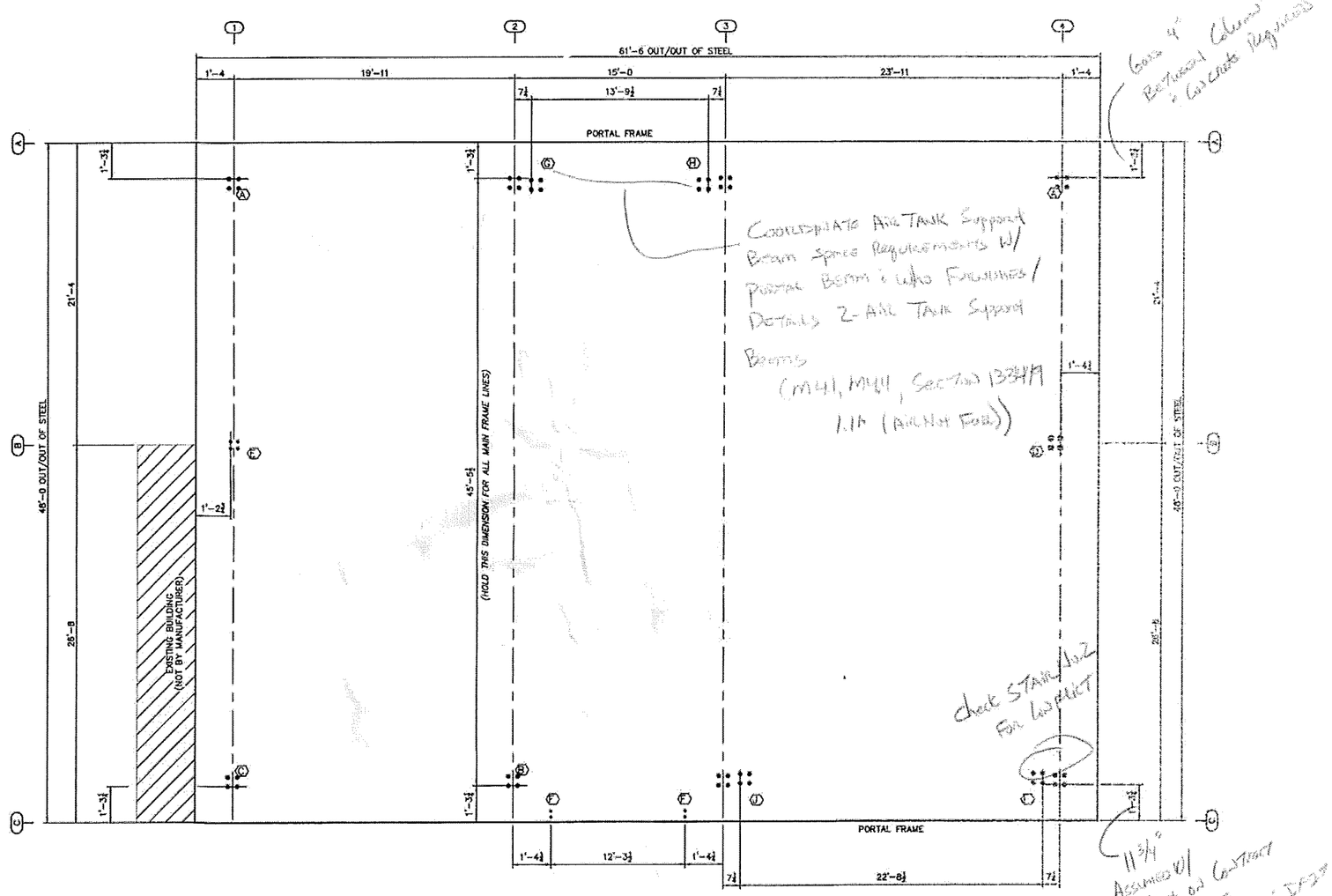
Signature:________ Date:________

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Anchor Rod Drawings

1) This drawing is for anchor rod placement only and is not foundation design.
2) Foundation must be square and level with all anchor rods true in size, location, and projection.
3) Projection shown must be held to keep threads clear of finished concrete.
4) This structural design data includes magnitude and location of design loads and suppose conditions, material properties, and type and size of major structural members necessary to show compliance with the Order Documents at the time of this issue. Any change to building loads or dimensions may change structural member sizes and locations shown. This structural design data will be superseded and voided by any future mailing.
5) Anchor rod size is determined by shear and tension at the bottom of the base plate. The length of the anchor rod and method of load transfer to the foundation are to be determined by the foundation engineer, and are not provided by the manufacturer.
6) Anchor rods are A36 or A307 material unless noted otherwise.

FINISH FLOOR AT ELEVATION 100'-0
ALL BASE PLATES AT FINISH FLOOR



Coordinate Air Tank Support Beam Space Requirements W/ Portal Beam & Wind Frames / Details 2-Air Tank Support Beams (M41, M44, Section B3/M1 1.1b (Anchor Rod))

Gives 4" Between Columns & Concrete Requires

check STAIR 1 & 2 For Interfer

11¾" Assumed W/ 8" Grout on Contract Documents (8+4 1/2 = 11¾" Space Needed)

ANCHOR ROD SETTING PLAN

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

SWC
EWB KEY PLAN EWD
SWA (H.S.)

ACCESSORY SCHEDULE			
MARK	DESCRIPTION	DETAIL	QUAN.

ANCHOR BOLTS TO BE DESIGNED BY FOUNDATON ENGINEER USING DIAMETERS SHOWN IN THIS TABLE.

ANCHOR ROD DESCRIPTION	QUANTITY
⅝"ø DIAMETER X	8
¾"ø DIAMETER X	48
1"ø DIAMETER X	4

Verify W/ Sheet S1.0 Bolt Detail / Allowable Loads

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By
A	08/03/11	FOR APPROVAL	DGS

CONSOLIDATED METAL RESOURCES
826 Park Street Suite 206, Castle Rock, CO 80109-1626
Phone: 303-688-1323 Fax: 303-688-1069

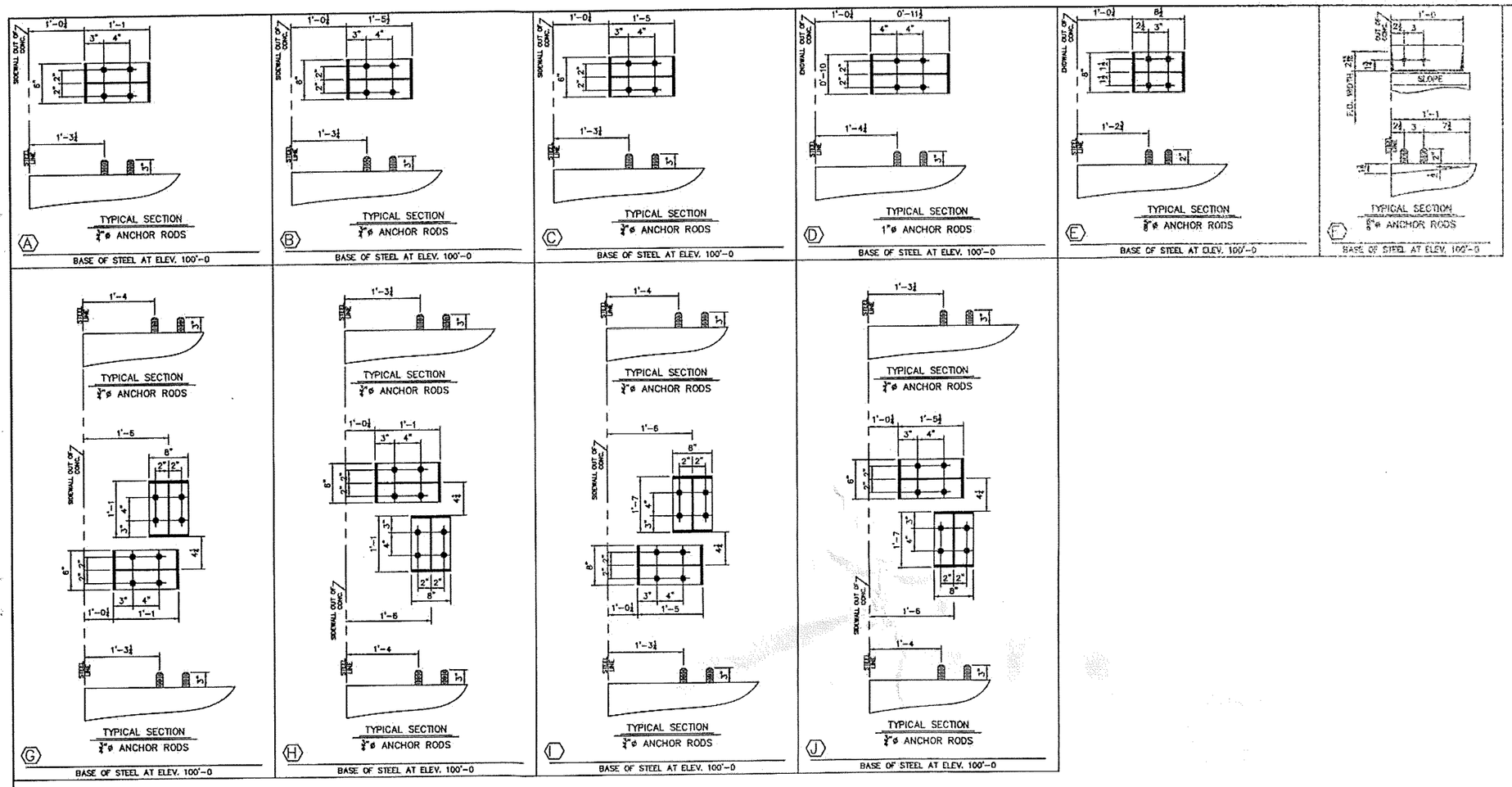
Customer: EASTERNSION CONSOLIDATED
5300 LA. HWY 3142
SORRENTO, LA. 707778

Project Name & Location:
MAGNOLIA BRANCH PLANT STATI
5300 LA. HWY 3140
SORRENTO LA 70778

Drawing Status: ☐ Preliminary ☐ Not For Construction ☐ For Approval ☒ Not For Construction ☐ For Construction ☐ For Factory Installation

Scale: NOT TO SCALE
Drawn By: DGS 8/3/11
Checked By: ART 8/5/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: F1 of 3

This engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.



Revision	Date	Description	By	Ck'd
A	06/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street, Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Customer: EXCENSION CONSOLIDATED
8009 LA. HWY 3142
SORRENTO, LA. 70778

Project Name & Location: MARVIN BRAUND PUMP STATI
8009 LA. HWY 3142
SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☐ For Approval (Not For Construction) ☐ For Construction Permit ☐ For Erection Installation

Scale: NOT TO SCALE
Drawn by: DGS 6/3/11
Checked by: ART 6/5/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: F2 of 3

The engineer whose seal appears hereon is an employee for the manufacturer, KCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

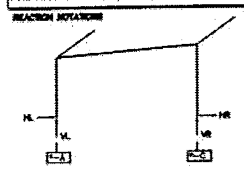
All American Building Systems

SUPPORT REACTIONS FOR EACH LOAD GROUP

NOTE: All reactions are in kips and kip-ft.

DATE: 7/27/11

REACTION NOTATIONS



LOAD GROUP REACTION TABLE * = 1

COLUMN	*-A			*-C		
BASE PLATE	8.0X12.875X0.375			8.0X17.0X0.5		
ANC. RODS	(4)-3/4			(4)-3/4		
LOAD GROUP	HL	VL	LHL	HR	VR	LHR
DL	0.4	2.0	0.0	-0.4	2.2	0.0
LL	1.2	5.4	0.0	-1.2	5.5	0.0
COLL	0.8	2.7	0.0	-0.8	2.7	0.0
EQ	-0.2	-0.2	0.0	-0.2	0.2	0.0
WL1	-4.5	-20.7	0.0	-3.6	-13.0	0.0
WL2	-8.5	-7.0	0.0	-1.5	0.8	0.0
LWL1	1.4	-17.0	0.0	-0.7	-18.9	0.0
LWL2	1.4	-19.3	0.0	-0.8	-17.8	0.0
LWL3	2.0	-12.3	0.0	-2.1	-11.3	0.0
LWL4	2.0	-11.8	0.0	-2.1	-12.9	0.0
WL3	8.1	-11.3	0.0	8.7	-22.5	0.0
WL4	3.0	2.6	0.0	10.7	-4.8	0.0

LOAD GROUP DESCRIPTION...

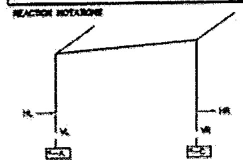
- DL : Roof Dead Load
- LL : Roof Live Load
- COLL : Roof Collateral Load
- EQ : Lateral Seismic Load (parallel to plane of frame)
- WL1 : Lateral Primary Wind Load
- WL2 : Lateral Primary Wind Load
- LWL1 : Longitudinal Primary Wind Load
- LWL2 : Longitudinal Primary Wind Load
- LWL3 : Longitudinal Primary Wind Load
- LWL4 : Longitudinal Primary Wind Load
- WL3 : Lateral Primary Wind Load
- WL4 : Lateral Primary Wind Load

All American Building Systems

SUPPORT REACTIONS FOR EACH LOAD GROUP

NOTE: All reactions are in kips and kip-ft.

REACTION NOTATIONS



LOAD GROUP REACTION TABLE * = 2 3

COLUMN	*-A			*-C		
BASE PLATE	8.0X13.0X0.5			8.0X17.125X0.5		
ANC. RODS	(4)-3/4			(4)-3/4		
LOAD GROUP	HL	VL	LHL	HR	VR	LHR
DL	0.6	2.6	0.0	-0.6	3.2	0.0
LL	2.3	8.3	0.0	-2.3	8.4	0.0
COLL	1.1	4.6	0.0	-1.1	4.7	0.0
EQ	-0.4	-0.3	0.0	-0.3	0.3	0.0
WL1	-7.5	-27.5	0.0	-4.4	-16.9	0.0
WL2	-10.4	-3.8	0.0	-1.1	4.7	0.0
LWL1	2.3	-29.3	0.0	-1.1	-27.3	0.0
LWL2	2.2	-26.4	0.0	-1.1	-30.2	0.0
LWL3	3.5	-21.3	0.0	-3.4	-18.7	0.0
LWL4	3.3	-20.0	0.0	-3.4	-20.8	0.0
WL3	4.4	-17.0	0.0	6.3	-29.5	0.0
WL4	3.1	6.7	0.0	12.8	-5.9	0.0

LOAD GROUP DESCRIPTION...

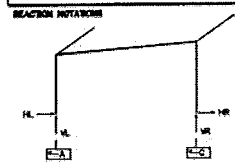
- DL : Roof Dead Load
- LL : Roof Live Load
- COLL : Roof Collateral Load
- EQ : Lateral Seismic Load (parallel to plane of frame)
- WL1 : Lateral Primary Wind Load
- WL2 : Lateral Primary Wind Load
- LWL1 : Longitudinal Primary Wind Load
- LWL2 : Longitudinal Primary Wind Load
- LWL3 : Longitudinal Primary Wind Load
- LWL4 : Longitudinal Primary Wind Load
- WL3 : Lateral Primary Wind Load
- WL4 : Lateral Primary Wind Load

All American Building Systems

SUPPORT REACTIONS FOR EACH LOAD GROUP

NOTE: All reactions are in kips and kip-ft.

REACTION NOTATIONS



LOAD GROUP REACTION TABLE * = 4

COLUMN	*-A			*-C		
BASE PLATE	8.0X12.875X0.5			8.0X16.75X0.375		
ANC. RODS	(4)-3/4			(4)-3/4		
LOAD GROUP	HL	VL	LHL	HR	VR	LHR
DL	0.4	2.3	0.0	-0.4	2.8	0.0
LL	1.5	8.4	0.0	-1.5	8.4	0.0
COLL	0.7	3.3	0.0	-0.7	3.2	0.0
EQ	-0.3	-0.2	0.0	-0.3	0.2	0.0
WL1	-7.8	-24.5	0.0	-4.0	-13.3	0.0
WL2	-10.1	-4.3	0.0	-1.7	0.9	0.0
LWL1	1.5	-20.0	0.0	-0.8	-18.8	0.0
LWL2	1.6	-18.1	0.0	-0.8	-20.6	0.0
LWL3	2.7	-14.5	0.0	-2.4	-13.4	0.0
LWL4	2.7	-13.7	0.0	-2.4	-14.3	0.0
WL3	8.8	-13.3	0.0	10.3	-26.5	0.0
WL4	3.6	3.6	0.0	12.8	-10.4	0.0

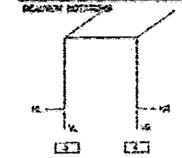
LOAD GROUP DESCRIPTION...

- DL : Roof Dead Load
- LL : Roof Live Load
- COLL : Roof Collateral Load
- EQ : Lateral Seismic Load (parallel to plane of frame)
- WL1 : Lateral Primary Wind Load
- WL2 : Lateral Primary Wind Load
- LWL1 : Longitudinal Primary Wind Load
- LWL2 : Longitudinal Primary Wind Load
- LWL3 : Longitudinal Primary Wind Load
- LWL4 : Longitudinal Primary Wind Load
- WL3 : Lateral Primary Wind Load
- WL4 : Lateral Primary Wind Load

All American Building Systems

SUPPORT REACTIONS FOR EACH LOAD GROUP

REACTION NOTATIONS



LOAD GROUP REACTION TABLE

COLUMN	LEFT COLUMN			RIGHT COLUMN		
BASE PLATE	8.0X11.5X0.375			8.0X8.0X0.375		
ANC. RODS	(4)-3/4			(4)-3/4		
LOAD GROUP	HL	VL	LHL	HR	VR	LHR
DL	0.0	1.1	0.0	0.0	1.1	0.0
EQ	-0.5	-1.1	0.0	-0.8	1.1	0.0
WL1	-6.0	-13.0	0.0	-6.3	13.0	0.0
WL2	6.3	13.6	0.0	6.2	-12.9	0.0

LOAD GROUP DESCRIPTION...

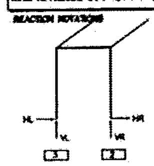
- DL : Roof Dead Load
- EQ : Lateral Seismic Load (parallel to plane of frame)
- WL1 : Lateral Primary Wind Load
- WL2 : Lateral Primary Wind Load

All American Building Systems

SUPPORT REACTIONS FOR EACH LOAD GROUP

NOTE: All reactions are in kips and kip-ft.

REACTION NOTATIONS



LOAD GROUP REACTION TABLE

COLUMN	LEFT COLUMN			RIGHT COLUMN		
BASE PLATE	8.0X12.857X0.375			8.0X12.857X0.375		
ANC. RODS	(4)-3/4			(4)-3/4		
LOAD GROUP	HL	VL	LHL	HR	VR	LHR
DL	0.0	0.6	0.0	0.0	0.6	0.0
EQ	-0.8	-1.5	0.0	-0.8	1.5	0.0
WL1	-5.1	-14.7	0.0	-5.1	14.7	0.0
WL2	5.1	14.7	0.0	5.1	-14.7	0.0

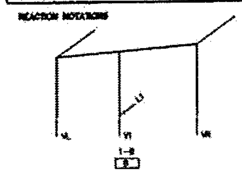
LOAD GROUP DESCRIPTION...

- DL : Roof Dead Load
- EQ : Lateral Seismic Load (parallel to plane of frame)
- WL1 : Lateral Primary Wind Load
- WL2 : Lateral Primary Wind Load

All American Building Systems

SUPPORT REACTIONS FOR EACH LOAD GROUP

REACTION NOTATIONS



LOAD GROUP REACTION TABLE

COLUMN	LEFT COLUMN			RIGHT COLUMN			1-B		
BASE PLATE	0.0X0.0X0.0			0.0X0.0X0.0			8.0X8.0X0.375		
ANC. BOLTS	N/A			N/A			(4)-3/4		
LOAD GROUP	HL	VL	LL	HR	VR	LR	HT	VT	LT
D	0.	0.	0.	0.	0.	0.	0.	0.5	0.
W+	0.	0.	0.	0.	0.	0.	0.	0.	7.7
W-	0.	0.	0.	0.	0.	0.	0.	0.	-8.5

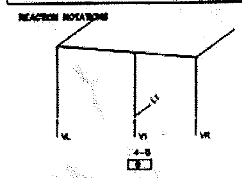
LOAD GROUP DESCRIPTION...

- D : DEAD LOAD
- W+ : WIND LOAD AS AN INWARD ACTING PRESSURE
- W- : WIND LOAD AS AN OUTWARD ACTING SUCTION

All American Building Systems

SUPPORT REACTIONS FOR EACH LOAD GROUP

REACTION NOTATIONS



LOAD GROUP REACTION TABLE

COLUMN	LEFT COLUMN			RIGHT COLUMN			4-B		
BASE PLATE	0.0X0.0X0.0			0.0X0.0X0.0			10.0X11.0X0.625		
ANC. BOLTS	N/A			N/A			(4)-1		
LOAD GROUP	HL	VL	LL	HR	VR	LR	HT	VT	LT
D	0.	0.	0.	0.	0.	0.	0.	0.8	0.
W+	0.	0.	0.	0.	0.	0.	0.	0.	17.3
W-	0.	0.	0.	0.	0.	0.	0.	0.	-18.8

LOAD GROUP DESCRIPTION...

- D : DEAD LOAD
- W+ : WIND LOAD AS AN INWARD ACTING PRESSURE
- W- : WIND LOAD AS AN OUTWARD ACTING SUCTION

NOTES

1) THE REACTIONS PROVIDED ARE BASED ON THE ORDER DOCUMENTS AT THE TIME OF MAILING. ANY CHANGES TO BUILDING LOADS OR DIMENSIONS MAY CHANGE THE REACTIONS. THE REACTIONS WILL BE SUPERSEDED AND VOIDED BY ANY FUTURE MAILING.

2) THE REACTIONS PROVIDED HAVE BEEN CREATED WITH THE FOLLOWING LAYOUT (UNLESS NOTED OTHERWISE).

a) A REACTION TABLE IS PROVIDED WITH THE REACTIONS FOR EACH LOAD GROUP.

b) RIGID FRAMES

(1) GABLED BUILDINGS

(a) LEFT AND RIGHT COLUMNS ARE DETERMINED AS IF VIEWING THE LEFT SIDE OF THE BUILDING, AS SHOWN ON THE ANCHOR ROD DRAWING, FROM THE OUTSIDE OF THE BUILDING.

(b) INTERIOR COLUMNS ARE SPACED FROM LEFT SIDE TO RIGHT SIDE.

(2) SINGLE SLOPE BUILDINGS

(a) LEFT COLUMN IS THE LOW SIDE COLUMN.

(b) RIGHT COLUMN IS THE HIGH SIDE COLUMN.

(c) INTERIOR COLUMNS ARE SPACED FROM LOW SIDE TO HIGH SIDE.

c) ENDWALLS

(1) LEFT AND RIGHT COLUMNS ARE DETERMINED AS IF VIEWING THE WALL FROM THE OUTSIDE.

(2) INTERIOR COLUMNS ARE SPACED FROM LEFT TO RIGHT.

d) ANCHOR ROD SIZE IS DETERMINED BY SHEAR AND TENSION AT THE BOTTOM OF THE BASE PLATE. THE LENGTH OF THE ANCHOR ROD AND METHOD OF LOAD TRANSFER TO THE FOUNDATION ARE TO BE DETERMINED BY THE FOUNDATION ENGINEER.

e) ANCHOR RODS ARE A36 OR A307 MATERIAL UNLESS NOTED OTHERWISE ON THE ANCHOR ROD LAYOUT DRAWING.

f) X-BRACING

(1) ROD BRACING REACTIONS HAVE BEEN INCLUDED IN VALUES SHOWN IN THE REACTION TABLES.

(2) FOR IBC AND UBC BASED BUILDING CODES, WHEN X-BRACING IS PRESENT IN THE SIDEWALL, INDIVIDUAL LONGITUDINAL SEISMIC LOADS (REQPEQ AND REQNEQ) DO NOT INCLUDE THE AMPLIFICATION FACTOR, Ω_o

(3) FOR CANADA BUILDING CODE (NBC), WHEN X-BRACING IS PRESENT IN THE SIDEWALL OR ENDWALL, INDIVIDUAL LONGITUDINAL SEISMIC LOADS (RQUPEQ & RQDNEQ) ARE MULTIPLIED BY FORCE REDUCTION FACTOR, Rd, WHEN SPECIFIED SHORT-PERIOD SPECTRAL ACCELERATION RATIO IeFaSa(0.2) IS GREATER THAN 0.45.

3) REACTIONS ARE PROVIDED AS UN-FACTORED FOR EACH LOAD GROUP APPLIED TO THE COLUMN. THE FOUNDATION ENGINEER WILL APPLY THE APPROPRIATE LOAD FACTORS AND COMBINE THE REACTIONS IN ACCORDANCE WITH THE BUILDING CODE AND DESIGN SPECIFICATIONS TO DETERMINE BEARING PRESSURES AND CONCRETE DESIGN. THE FACTORS APPLIED TO LOAD GROUPS FOR THE STEEL COLUMN DESIGN MAY BE DIFFERENT THAN THE FACTORS USED IN THE FOUNDATION DESIGN.

THE MANUFACTURER DOES NOT PROVIDE "MAXIMUM" LOAD COMBINATION REACTIONS. HOWEVER, THE INDIVIDUAL LOAD REACTIONS PROVIDED MAY BE USED BY THE FOUNDATION ENGINEER TO DETERMINE THE APPLICABLE LOAD COMBINATIONS FOR HIS/HER DESIGN PROCEDURES AND ALLOW FOR AN ECONOMICAL FOUNDATION DESIGN.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES

825 Park Street Suite 206, Castle Rock, CO 80109-1526

Phone: 303-688-1323 Fax: 303-688-1069

Customer: ASCENSION CONSOLIDATED, 8300 LA. HWY 3140, SORRENTO, LA. 707798

Project Name & Location: MARVIN BRAUND PUMP STATI, 8300 LA. HWY 3140, SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☒ For Approval (Not For Construction) ☐ For Construction Permit ☐ For Erector Installation

Scale: NOT TO SCALE

Drawn by: DGS 8/3/11

Checked by: ART 8/5/11

Project Engineer: AXW

Job Number: 22-T-55214-1

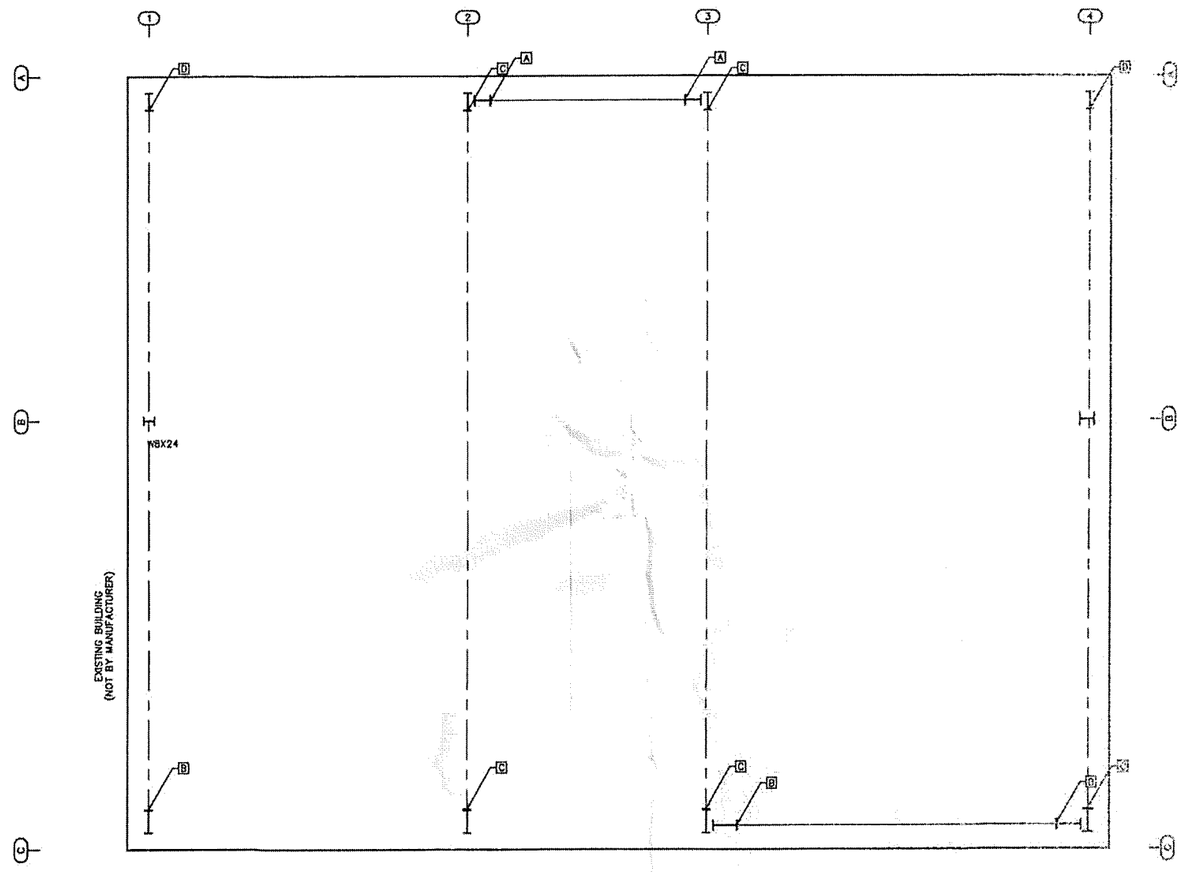
Sheet Number: F3 of 3

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

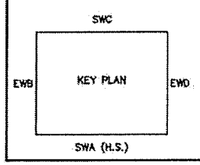
THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

SPLICE BOLT TABLE					
CONN.	QTY.	SIZE	TYPE	HARDENED WASHERS	BEVELED WASHERS
A	(10)	$\frac{3}{4}$ X 2"	A325 B&N	0	0
B	(12)	$\frac{3}{4}$ X 2"	A325 B&N	0	0
C	(10)	$\frac{3}{4}$ X $2\frac{1}{2}$	A325 B&N	0	0
D	(6)	$\frac{3}{4}$ X 2"	A325 B&N	0	0



PRIMARY STEEL LOCATION PLAN



THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street, Suite 206, Castle Rock, CO 80109-1525
Phone: 303-688-1323 Fax: 303-688-1069

Customer: CONSOLIDATED ESCOLLASTIQUE, LLC
HWY 3142
SORRENTO, LA. 70778

Project Name & Location: MORGAN BRAUND PUMP STATI
HWY 3142
SORRENTO LA 70778

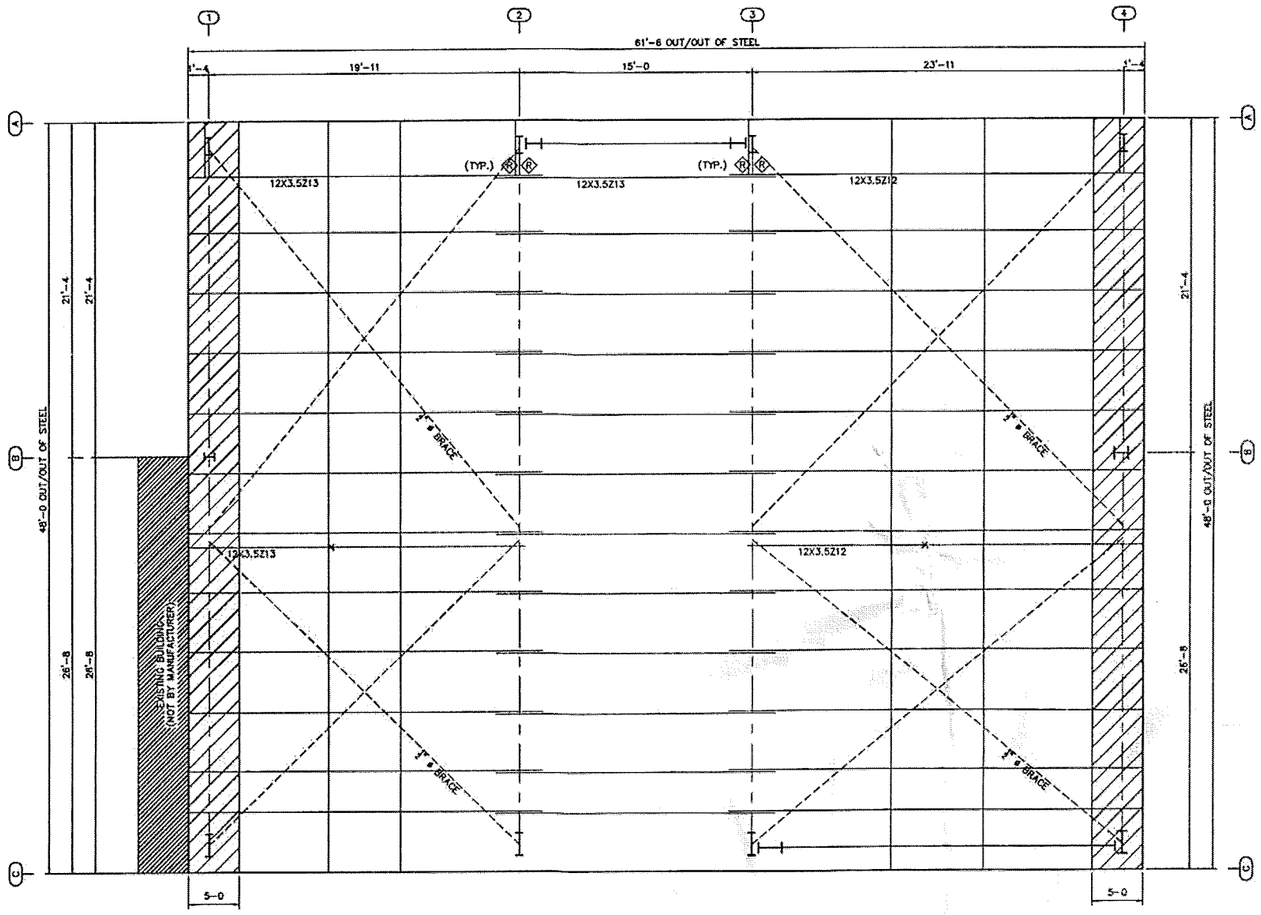
Drawing Status:
☐ Preliminary
☐ Bid For Construction
☐ For Approval
☒ Bid For Construction
☐ For Construction Permit
☐ For Erector Installation

Scale:	NOT TO SCALE
Drawn by:	DGS 8/3/11
Checked by:	ART 8/5/11
Project Engineer:	AKW
Job Number:	22-T-55214-1
Sheet Number:	E2 of 15

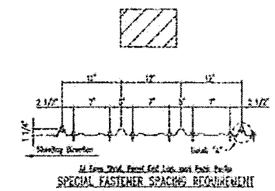
The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groupe, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

DENOTES: PURLIN OR GIRT STRUT.

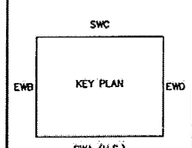
WHEN ROOF SYSTEM IS SSR, ROOF PANEL CLIPS ARE NOT REQUIRED AND HAVE NOT BEEN PROVIDED AT PURLIN STRUTS.



ROOF FRAMING PLAN



SPECIAL FASTENER SPACING REQUIREMENT



Z_SECTION LAP TABLE			
SYMBOL	LAP (LENGTH)	SYMBOL	LAP (LENGTH)
S	0'-2" (3 7/8")	T	2'-4"(2'-5 7/8")
R	1'-4"(1'-5 7/8")	V	3'-0"(3'-1 7/8")

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
526 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Customer: EASTERSUN CONSOLIDATED
11300 LA. HWY 3140
SORRENTO, LA. 70778

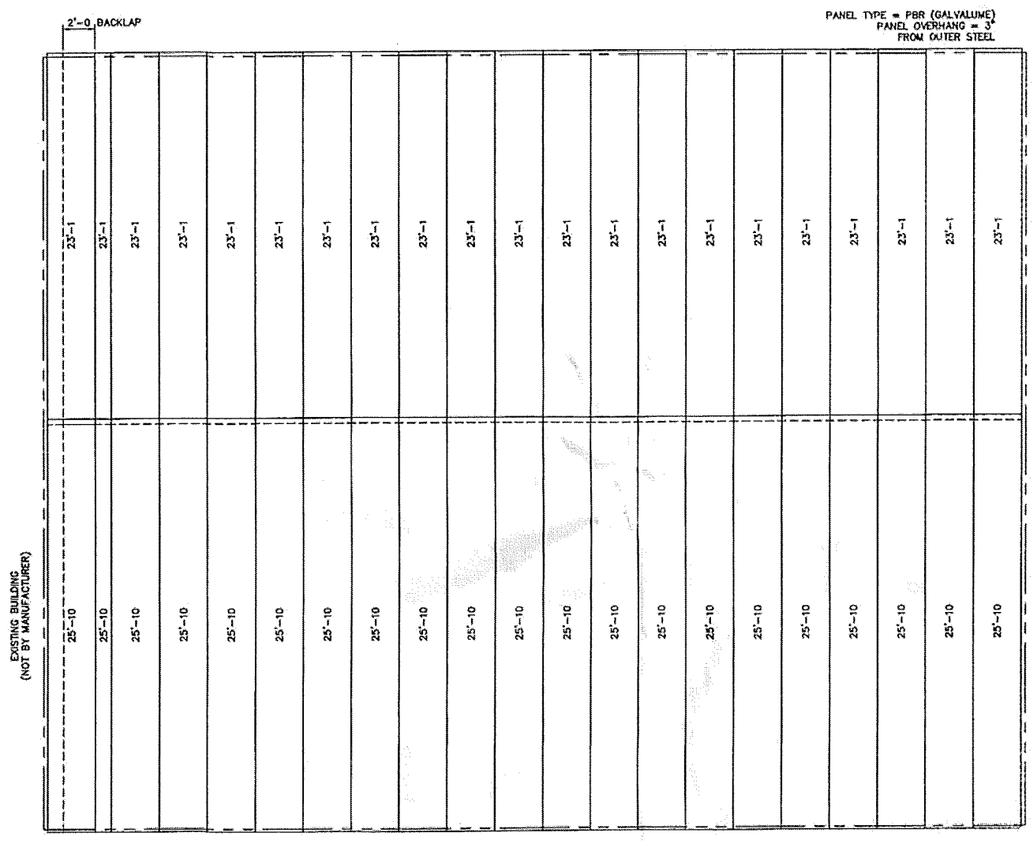
Project Name & Location: MARVIN BRAUND FOUNDATI
11300 LA. HWY 3140
SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☐ For Construction Permit ☒ For Approval (Not For Construction) ☐ For Erector Installation

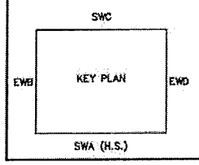
Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/3/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: E3 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

ROOF TO MEET UL90 REQUIREMENTS. SEE DETAILS FOR SPECIFIC INSTRUCTIONS.



ROOF SHEETING PLAN



THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Project Name & Location:
HARVEY BOULVARD PUMP STATI
8300 LA. HWY 3140
SORRENTO LA 70778

Customer:
LASCENSION CONSOLIDATED
8300 LA. HWY 3140
SORRENTO, LA. 707778

Drawing Status:
☐ Preliminary
☐ Not For Construction
☐ For Approval
☒ For Construction
☐ Construction Permit
☐ For Erector Installation

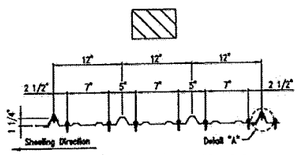
Scale:	NOT TO SCALE
Drawn by:	DGS 8/3/11
Checked by:	ART 8/5/11
Project Engineer:	AXW
Job Number:	22-T-55214-1
Sheet Number:	E4 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groupe, Inc. or one of its affiliates, for the materials described herein. Sold seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

SCHEDULE OF ACCESSORIES

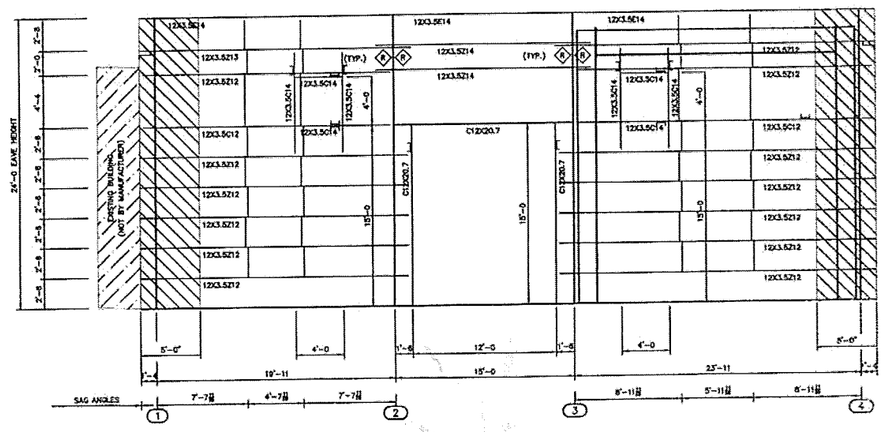
NO. REQD	DESCRIPTION
4	4'-0 X 4'-0 FIELD LOCATED FRAMED OPENINGS

REFER TO DETAILS ON INSTALLATION OF FRAMED OPENINGS.
USE STANDARD WALL PROCEDURES TO ERECT THE SIDEWALL AND ENDWALL PANELS.

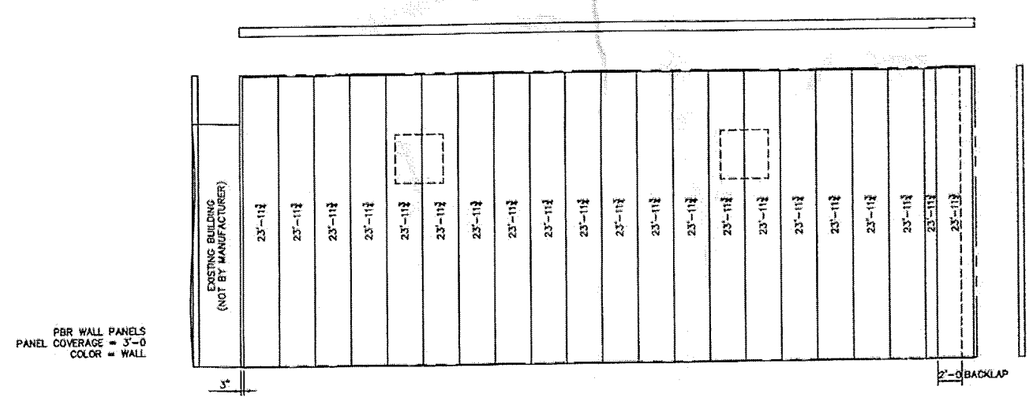


At Eave Strut, Panel End Lap, and Peak Purlin

SPECIAL FASTENER SPACING REQUIREMENT



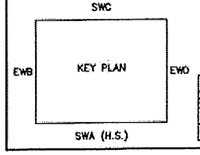
SIDEWALL ELEVATION "SWA" AT GRID LINE "C"



PBR WALL PANELS
PANEL COVERAGE = 3'-0
COLOR = WALL

WALL SHEETING ELEVATION "SWA"
BLDG A

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.



Z_SECTION LAP TABLE			
SYMBOL	LAP (LENGTH)	SYMBOL	LAP (LENGTH)
S	0'-2" (3 3/4")	T	2'-4"(2'-5 3/4")
R	1'-4"(1'-5 3/4")	V	3'-0"(3'-1 3/4")

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1723 Fax: 303-688-1069

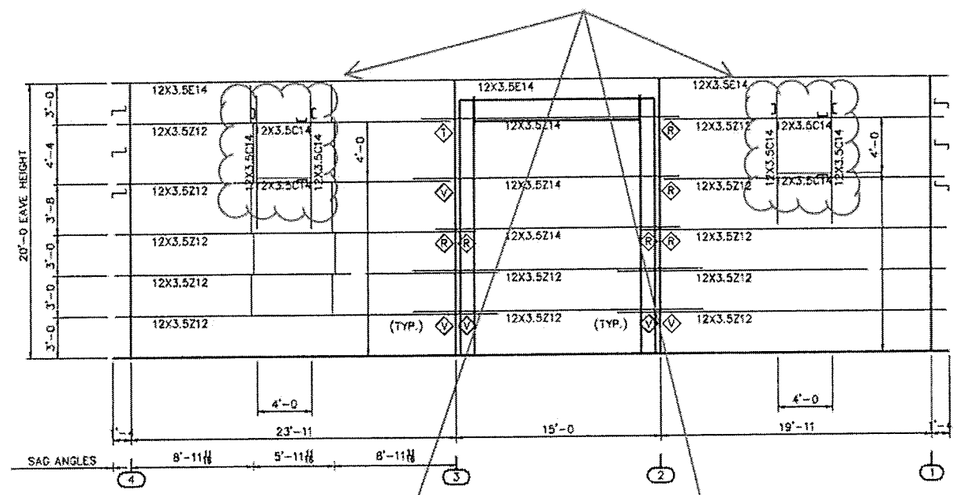
Customer: ELASCENSION CONSOLIDATED
Project Name & Location: MARVIN BRAUND PUMP STATI
8320 LAKE MAIN ROAD
SORRENTO, LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☒ For Approval ☐ For Construction ☐ For Construction Permit ☐ For Erector Installation

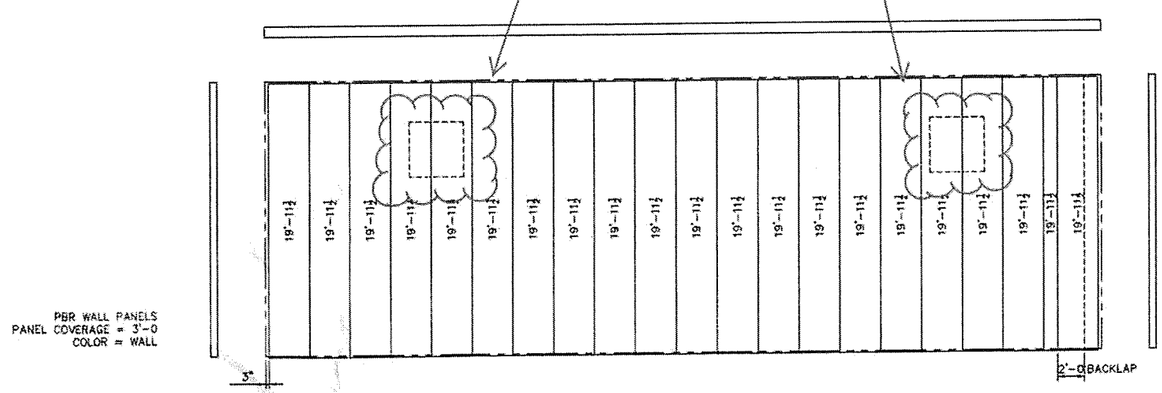
Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/5/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: E5 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

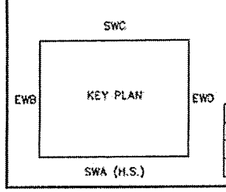
These louver openings are typical. There are five (5) each field located at the end of each engine (total ten (10)).



SIDEWALL ELEVATION "SWC" AT GRID LINE "A"



WALL SHEETING ELEVATION "SWC"
BLDG A



Z_SECTION LAP TABLE			
SYMBOL	LAP (LENGTH)	SYMBOL	LAP (LENGTH)
S	0'-2" (3 3/8")	T	2'-4"(2'-5 3/8")
R	1'-4"(1'-5 3/8")	U	3'-0"(3'-1 3/8")

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DCS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

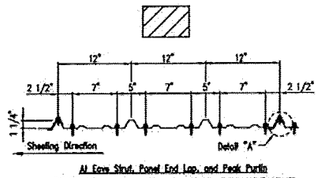
Customer: E.ASCENSION CONSOLIDATED
8300 LA. HWY 3140
SORRENTO, LA. 70778

Project Name & Location:
MARVIN BRAUND PUMP STATI
8300 LA. HWY 3140
SORRENTO LA 70778

Drawing Status:
☐ Preliminary (Not For Construction)
☐ For Approval (Not For Construction)
☐ For Construction Permit
☐ For Fabrication Installation

Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/5/11
Project Engineer:
Job Number: 22-T-55214-1
Sheet Number: E6 of 15

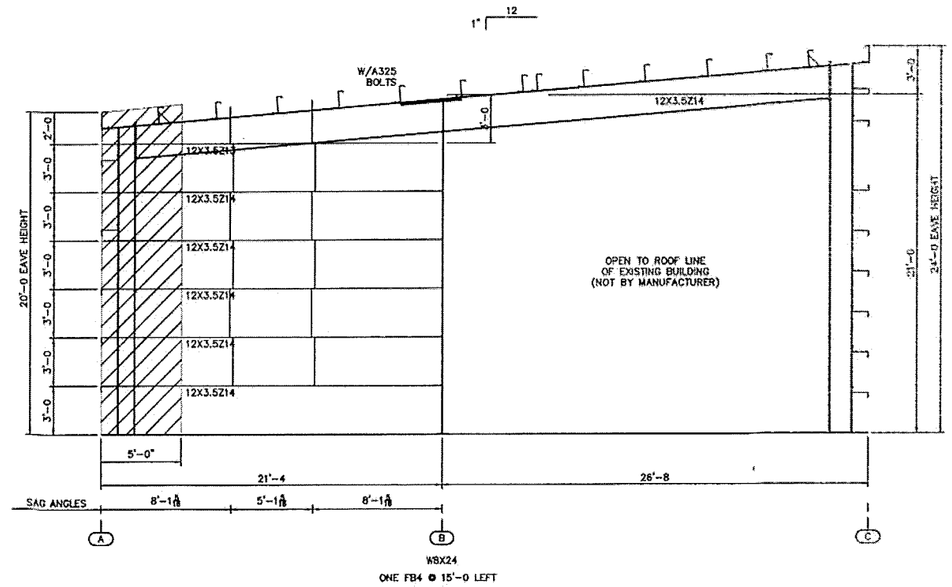
The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.



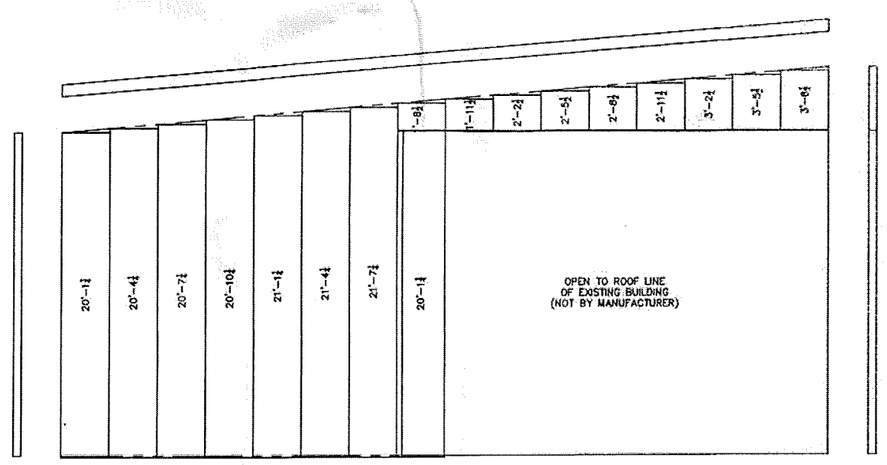
At Eave Strut, Panel End Lap, and Peak Purlin

SPECIAL FASTENER SPACING REQUIREMENT

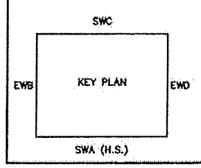
CL292– FASTENS BETWEEN THE GIRTS ON EACH SIDE OF THE ENDWALL COLUMNS, AT ALL GIRT ELEVATIONS. REFER TO DETAILS.



ENDWALL ELEVATION "EWB" AT GRID LINE "1"



PBR WALL PANELS
PANEL COVERAGE = 3'-0
COLOR = WALL
PANEL PKG. REQ'D. = PBS-1



WALL SHEETING ELEVATION "EWB"
BLDG A

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	by	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1303 Fax: 303-688-1069

Customer: E.ASCENSION CONSOLIDATED 8300 LA. HWY 3140 SORRENTO, LA. 70778

Project Name & Location: MARION DRAINS PUMP STATI 8300 LA. HWY 3140 SORRENTO LA 70778

Drawing Status: ☐ Preliminary ☐ For Construction ☐ For Construction Permit ☐ For Approval ☒ Shop Fabrication ☐ For Erector Installation

Scale: NOT TO SCALE

Drawn by: DGS 8/3/11

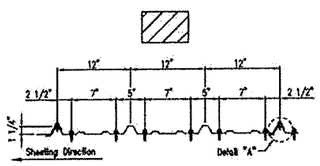
Checked by: ART 8/5/11

Project Engineer: AXW

Job Number: 22-T-55214-1

Sheet Number: E7 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

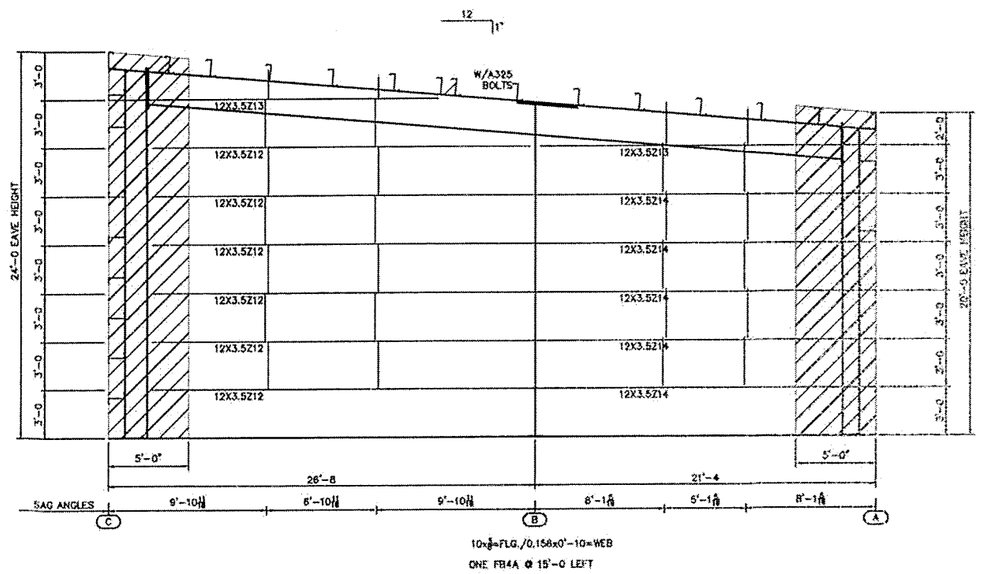


At Eave Strut, Panel End Lap, and Peak Purlin

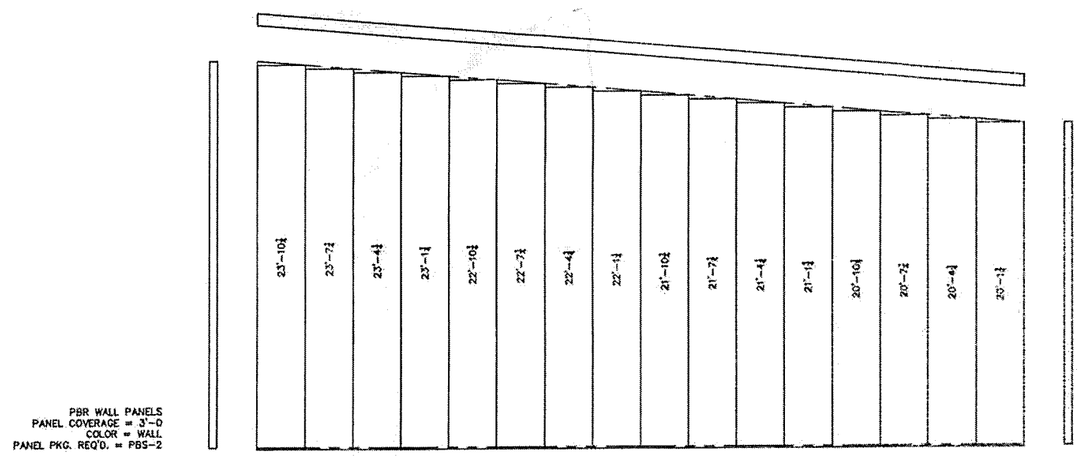
SPECIAL FASTENER SPACING REQUIREMENT

CL292– FASTENS BETWEEN THE GIRTS ON EACH SIDE OF THE ENDWALL COLUMNS, AT ALL GIRT ELEVATIONS. REFER TO DETAILS.

PC1 CONNECTS EACH ENDWALL GIRT TO THE CORNER COLUMN, UNLESS NOTED OTHERWISE. REFER TO DETAILS.

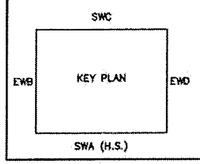


ENDWALL ELEVATION "EWD" AT GRID LINE "4"



PBR WALL PANELS
PANEL COVERAGE = 3'-0
COLOR = WALL
PANEL PKG. REQ'D. = PBS-2

WALL SHEETING ELEVATION "EWD"
BLDG A



THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/23/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
828 Park Street Suite 238, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-0969

Customer: LANDSTAR CONSOLIDATED 8300 LA. HWY 3140 SORRENTO, LA. 70778

Project Name & Location: MARSH BUILDING (PUMP STAT) 8300 LA. HWY 3140 SORRENTO LA 70778

Drawing Status: ☐ Drawings For Construction ☐ Drawings For Approval ☒ Out For Construction ☐ For Permit ☐ For Erection Installation

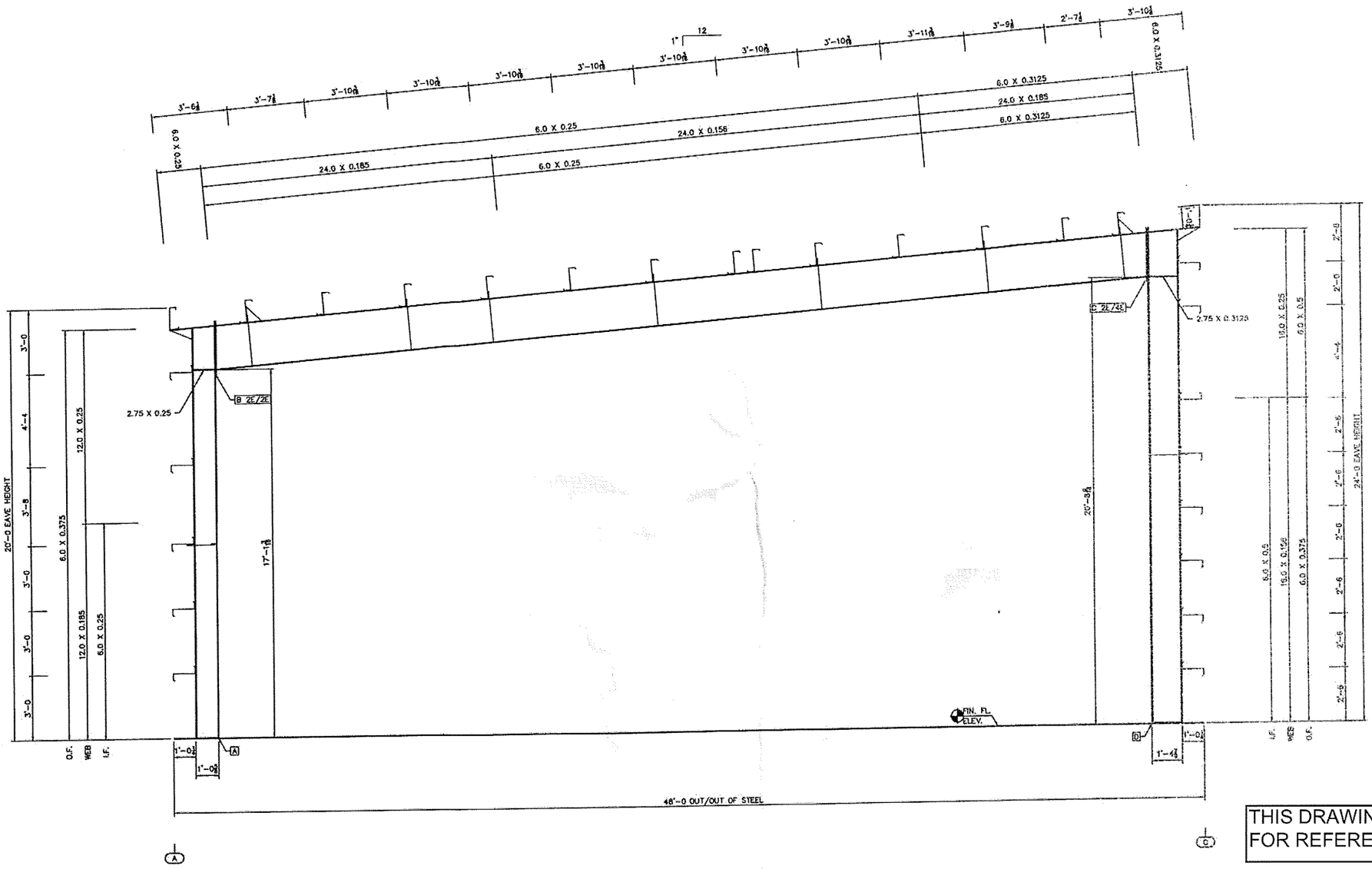
Scale:	NOT TO SCALE
Drawn by:	DGS 8/3/11
Checked by:	ART 8/3/11
Project Engineer:	AKW
Job Number:	22-1-15214-1
Sheet Number:	E8 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, MCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

/PROJECTS\XDS-V155-20110708 FRAME = Active/Eng/22-T-55214/ver04-axwatts/Bldg-A/Drftg/x03L 7/27/11 15:44:44
/PROJECTS\XDS-V155-20110708 FB SET = Eng/22-T-55214/ver04-axwatts/Bldg-A/DRFTG/x03L

GENERAL NOTES
FRAME CLEARANCES SHOWN ARE APPROXIMATE AND MAY VARY DUE TO CONDITIONS (DEFLECTION).

VERTICAL CLEARANCE DIMENSIONS ARE FROM FINISHED FLOOR REFERENCE ELEVATION.



CROSS SECTION AT FRAME LINE "1"

	PLATE SIZE TABLE		SPLICE BOLT TABLE			
CONN.	LOW SIDE	HIGH SIDE	QTY. SIZE	TYPE	HARDENED WASHERS	BEVELED WASHERS
A	6 X 0.375 X 1'-0⅝					
B	6 X 0.5 X 9'-3⅜	6 X 0.5 X 2'-5½	(8) ¾ X 2"	A325 B&N	0	0
C	6 X 0.5 X 2'-5⅝	6 X 0.625 X 7'-11¼	(12) ¾ X 2"	A325 B&N	0	0
D	6 X 0.5 X 1'-5					

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
829 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1359

Customer: EASCENSION CONSOLIDATED 8300 LA. HWY 3140 SORRENTO, LA. 70778

Project Name & Location: MARVIN BRAUND PUMP STATI 8300 LA. HWY 3140 SORRENTO LA 70778

Drawing Status: ☐ Preliminary ☐ Not For Construction ☒ For Approval ☐ Not For Construction ☐ For Construction Permit ☐ For Erection Installation

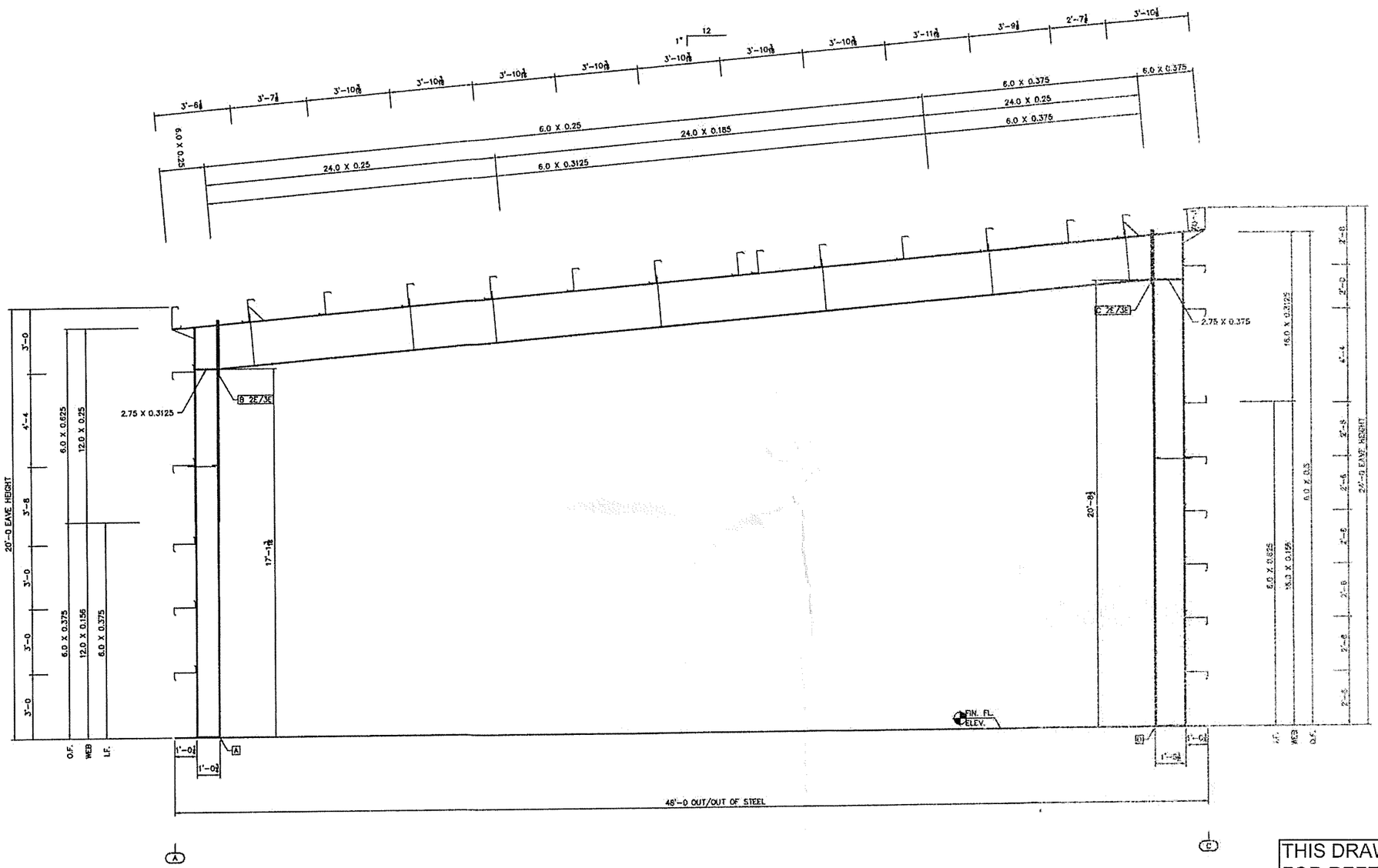
Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/5/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: E9 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

/PROJECTS\XDS-V155-20110708 FRAME = Active/Eng/22-T-55214/ver04-axwatts/Bldg-A/Drftg/x01L 7/27/11 15:56:16
/PROJECTS\XDS-V155-20110708 FB SET = Eng/22-T-55214/ver04-axwatts/Bldg-A/DRFTG/x01L

GENERAL NOTES
FRAME CLEARANCES SHOWN ARE APPROXIMATE AND MAY VARY DUE TO CONDITIONS (DEFLECTION).

VERTICAL CLEARANCE DIMENSIONS ARE FROM FINISHED FLOOR REFERENCE ELEVATION.



CROSS SECTION AT FRAME LINE "2 & 3"

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

	PLATE SIZE TABLE		SPLICE BOLT TABLE				
CONN.	LOW SIDE	HIGH SIDE	QTY.	SIZE	TYPE	HARDENED WASHERS	BEVELED WASHERS
A	6 X 0.5 X 1'-1						
B	6 X 0.75 X 9'-3¾	6 X 0.5 X 2'-5⅝	(10)	¾ X 2½	A325 B&N	0	0
C	6 X 0.75 X 2'-5¾	6 X 0.75 X 7'-11⅞	(10)	¾ X 2½	A325 B&N	0	0
D	6 X 0.5 X 1'-5⅝						

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
826 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Customer: EASCENSION CONSOLIDATED
13500 LA. HWY 3140
SORRENTO, LA. 70778

Project Name & Location:
MARVIN BRAUND PUMP STATI
13500 LA. HWY 3140
SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☒ For Approval (Not For Construction) ☐ For Construction Permit ☐ For Erector Installation

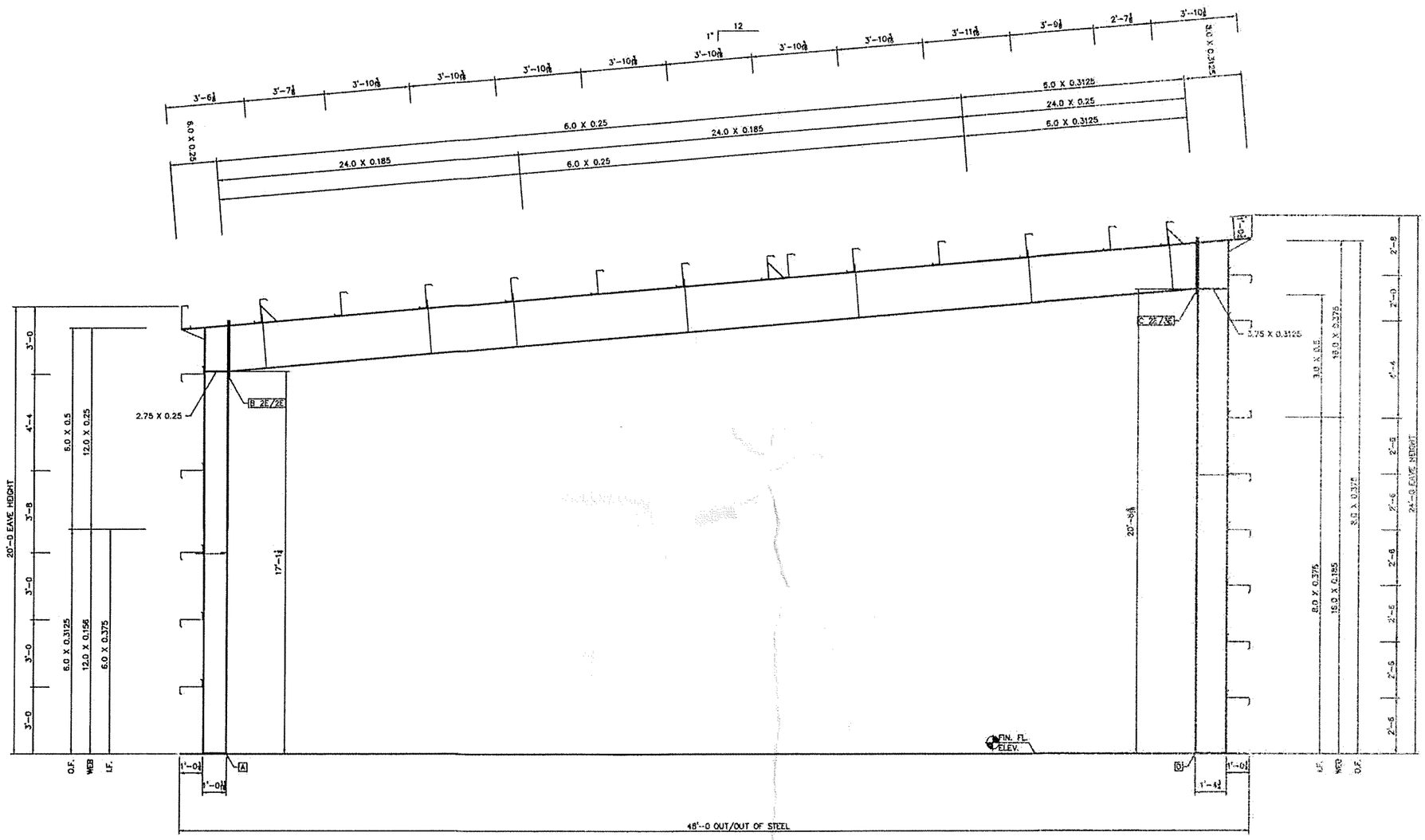
Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/5/11
Project Engineer: KKW
Job Number: 22-T-55214-1
Sheet Number: E10 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

/PROJECTS\XDS-V155-20110708 FRAME = Active/Eng/22-T-55214/ver04-axwatts/Bldg-A/Drftg/x02L 7/27/11 15:52:20
/PROJECTS\XDS-V155-20110708 FB SET = Eng/22-T-55214/ver04-axwatts/Bldg-A/DRFTG/x02L

GENERAL NOTES
FRAME CLEARANCES SHOWN ARE APPROXIMATE AND MAY VARY DUE TO CONDITIONS (DEFLECTION).

VERTICAL CLEARANCE DIMENSIONS ARE FROM FINISHED FLOOR REFERENCE ELEVATION.



CROSS SECTION AT FRAME LINE "4"

	PLATE SIZE TABLE		SPLICE BOLT TABLE			
CONN.	LOW SIDE	HIGH SIDE	QTY. SIZE	TYPE	HARDENED WASHERS	BEVELED WASHERS
A	6 X 0.5 X 1'-0⅛					
B	6 X 0.625 X 9'-3⅛	6 X 0.5 X 2'-5½	(8) ¾ X 2"	A325 B&N	0	0
C	6 X 0.625 X 2'-5⅛	8 X 0.625 X 2'-6⅛	(10) ¾ X 2½	A325 B&N	0	0
D	8 X 0.375 X 1'-4½					

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REFINEMENT, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Chk
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
526 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Customer: E.ASCENSION CONSOLIDATED 3140 8300 LA. HWY 3140 SORRENTO, LA. 70778

Project Name & Location: LARRON BRAUND PUMP STATI 8300 LA. HWY 3140 SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☒ For Approval ☐ Not For Construction ☐ For Construction Permit ☐ For Erector Installation

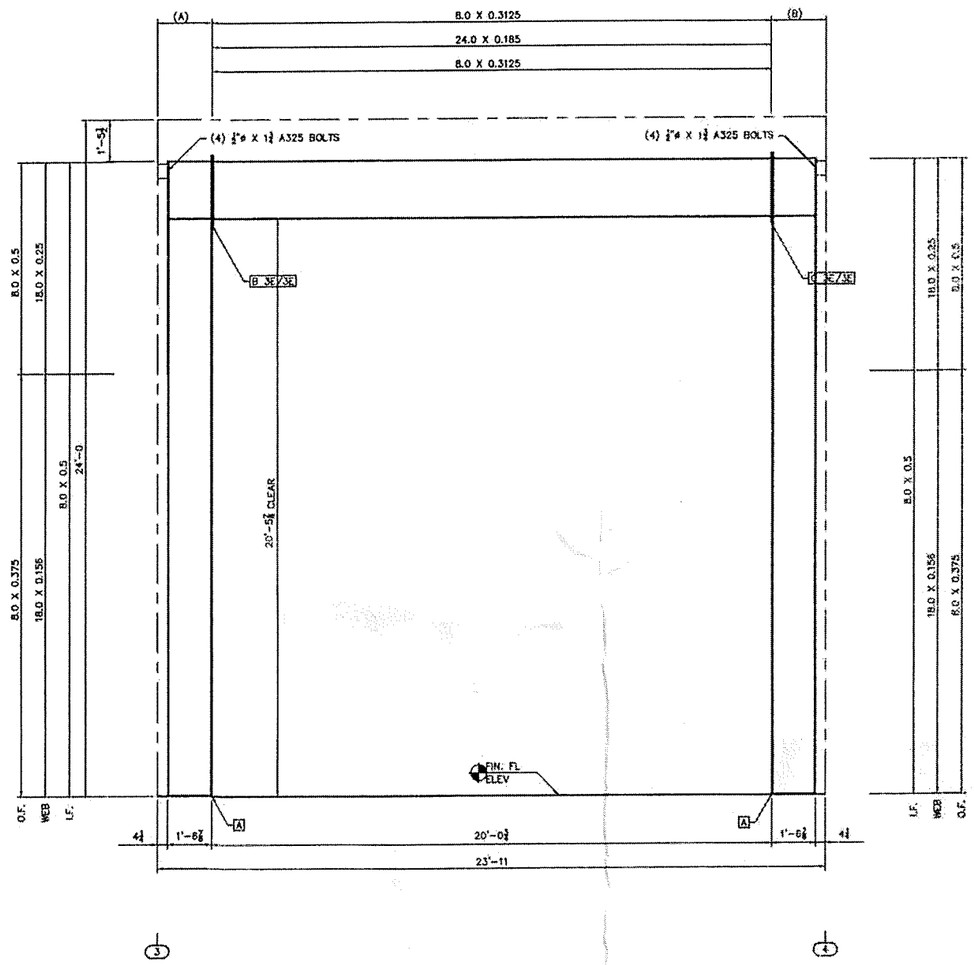
Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/8/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: E11 of 15

This engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

/PROJECTS\XDS-V155-20110708 FRAME = Active/Eng/22-T-55214/ver04-oxwolfe/Bldg-A/Drfg/s04L 7/27/11 16:10:21

GENERAL NOTES
FRAME CLEARANCES SHOWN ARE APPROXIMATE AND MAY VARY DUE TO CONDITIONS (DEFLECTION).

VERTICAL CLEARANCE DIMENSIONS ARE FROM FINISHED FLOOR REFERENCE ELEVATION.



CROSS SECTION AT PORTAL FRAME

PLATE SIZES
(A) 8.0 X 0.3125
(B) 8.0 X 0.3125

	PLATE SIZE TABLE		SPLICE BOLT TABLE			
CONN.	LOW SIDE	HIGH SIDE	QTY. SIZE	TYPE	HARDENED WASHERS	BEVELED WASHERS
A	8" X 0.375 X 1'-7					
B	8" X 0.5 X 22'-8¾	8" X 0.5 X 2'-5¾	(12) ¾ X 2"	A325 B&N	0.0	0
C	8" X 0.5 X 2'-5¾	8" X 0.5 X 22'-8¾	(12) ¾ X 2"	A325 B&N	0.0	0

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
828 Park Street Suite 208, Castle Rock, CO 80109-1926
Phone: 303-688-1323 Fax: 303-688-1069

Customer:
LA ASCENSION CONSOLIDATED
8300 LA. HWY 3140
SORRENTO, LA. 70778

(Project Name & Location:
MAIRAM BRANCH PUMP STATI
8300 LA. HWY 3140
SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction). ☐ For Approval ☒ For Construction. ☐ For Permit Construction Permit. ☐ For Permit Installation.

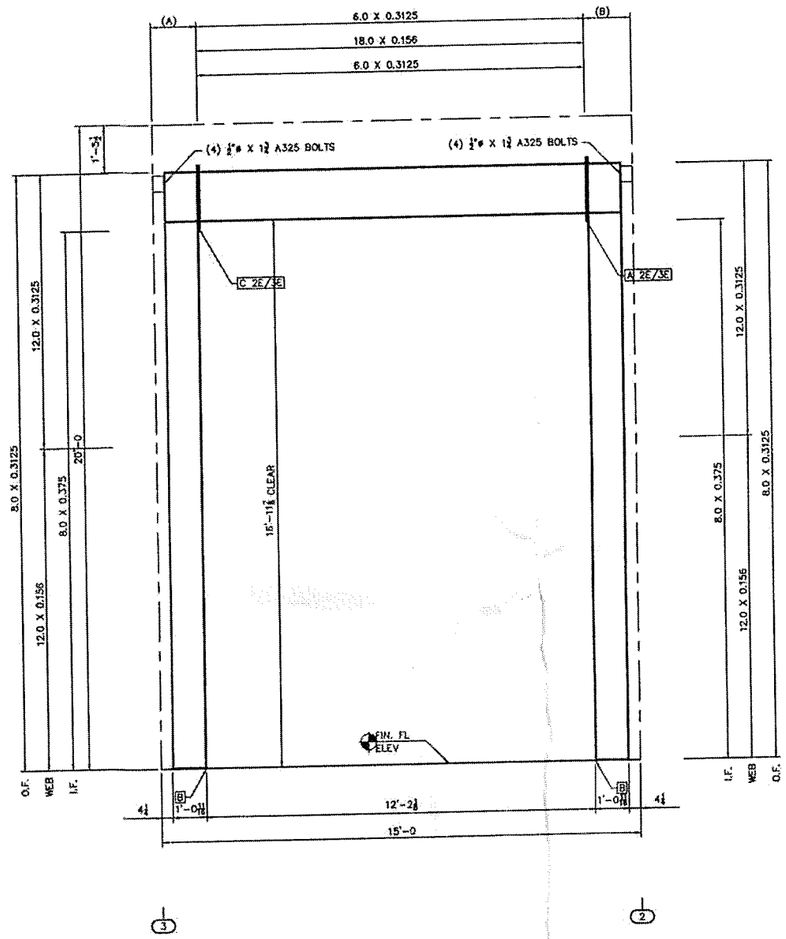
Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/5/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: E12 of 15

This engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc., or one of its affiliates, for the materials described hereon. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

/PROJECTS\XDS-V155-20110708 FRAME = Active/Eng/22-T-55214/ver04-axwatts/Bldg-A/Drltg/x05L 7/27/11 16:14:32

GENERAL NOTES
FRAME CLEARANCES SHOWN ARE APPROXIMATE AND MAY VARY DUE TO CONDITIONS (DEFLECTION).

VERTICAL CLEARANCE DIMENSIONS ARE FROM FINISHED FLOOR REFERENCE ELEVATION.



CROSS SECTION AT PORTAL FRAME

PLATE SIZES
(A) 8.0 X 0.3125
(B) 8.0 X 0.3125

	PLATE SIZE TABLE		SPLICE BOLT TABLE				
CONN.	LOW SIDE	HIGH SIDE	QTY.	SIZE	TYPE	HARDENED WASHERS	BEVELED WASHERS
A	8" X 0.5 X 1'-11 1/4	8" X 0.5 X 2'-0	(10)	3/4" X 2"	A325 B&N	0.0	0
B	8" X 0.375 X 1'-0 11/16						
C	8" X 0.5 X 2'-0	8" X 0.5 X 1'-11 1/4	(10)	3/4" X 2"	A325 B&N	0.0	0

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
825 Park Street Suite 205, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Customer: EXCELSION CONSOLIDATED
Project Name & Location: MASTIN DRAINO PUMP STATI
5300 LA. HWY 3140
SORRENTO, LA. 70778
SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☐ For Construction Permit ☐ For Approval ☒ For Construction ☐ For Erector Installation

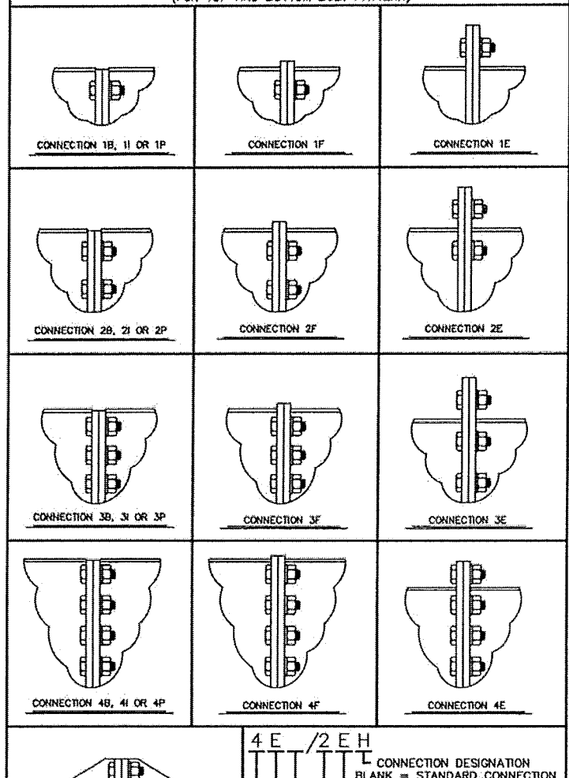
Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/5/11
Project Engineer: KXW
Job Number: 22-T-55214-1
Sheet Number: E13 of 15

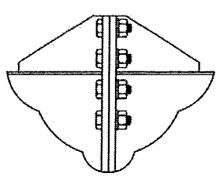
The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.

Frame Documentation
Connection Bolt Details (A325)

Date: 05-12-10
Mar '11 | 02

CONNECTION CODES
(FOR TOP AND BOTTOM BOLT PATTERN)





4 E /2 E H
- CONNECTION DESIGNATION
- BLANK = STANDARD CONNECTION
- H = HEAVY CONNECTION
- BOTTOM CONNECTION CODE
- BOTTOM QUANTITY OF BOLT ROWS
- CONNECTION DESIGNATION
- BLANK = STANDARD CONNECTION
- H = HEAVY CONNECTION
- TOP CONNECTION CODE
- TOP QUANTITY OF BOLT ROWS

CONNECTION CODE FORMAT

CONNECTION CODE DESCRIPTION

B = THIS DESCRIPTION CODE IS USED TO DEFINE SHEAR CONNECTIONS. BOLTS ARE LOCATED INSIDE THE OUTER FLANGE AND CONNECTION PLATE IS RECESSED 1/8" BELOW THE OUTER FLANGE.

I = THIS DESCRIPTION CODE IS USED TO DEFINE MOMENT CONNECTIONS. BOLTS ARE LOCATED INSIDE THE OUTER FLANGE AND CONNECTION PLATE IS RECESSED 1/8" BELOW THE OUTER FLANGE.

P = THIS DESCRIPTION CODE IS THE SAME AS B CODE, BUTT PLATE LENGTH MUST BE A MINIMUM OF 1/2" THE RAFTER DEPTH AND SHALL NOT EXCEED RAFTER TOTAL DEPTH.

F = THIS DESCRIPTION CODE IS USED TO DEFINE MOMENT CONNECTIONS. BOLTS ARE LOCATED INSIDE THE OUTER FLANGE AND CONNECTION PLATE PROJECTS 1/2" ABOVE THE OUTER FLANGE.

E = THIS DESCRIPTION CODE IS USED TO DEFINE MOMENT CONNECTIONS. BOLTS ARE LOCATED WITH ONE SET OUTSIDE THE OUTER FLANGE AND REMAINDER SETS LOCATED INSIDE THE OUTER FLANGE.

4X = THIS DESCRIPTION CODE IS USED TO DEFINE MOMENT CONNECTIONS. BOLTS ARE LOCATED WITH TWO SETS EITHER SIDE THE OUTER FLANGE WITH A GUSSET PLATE OUTSIDE THE OUTER FLANGE OR COLUMN CAP PLATE.

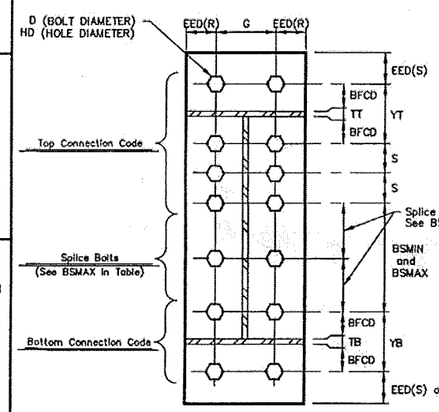
CONNECTION BOLT DATA

NAME	DESCRIPTION FOR A325 BOLT DIMENSIONS	A325 CONNECTION BOLT DIMENSIONS					
D	DIAMETER OF THE BOLT	1/2"	3/4"	7/8"	1"	1 1/4"	1 1/2"
HD	BOLT HOLE DIAMETER	9/16"	13/16"	15/16"	1 1/16"	1 5/16"	1 9/16"
G	BOLT GAUGE	2 1/2"	3"	4"	3 1/2"	4"	5 1/2"
	MAX. WEB THICKNESS (Max. 5/16" Fillet Weld) WITHOUT WASHER	1"	1 1/8"	1 7/8"	1 1/4"	1 3/8"	2 1/8"
	MAX. WEB THICKNESS (Max. 5/16" Fillet Weld) WITH WASHER	3/4"	7/8"	1 5/8"	7/8"	7/8"	1 7/8"
HG	HEAVY CONN. BOLT GAUGE	N/A	2 1/4"	2 5/8"	3"	3 3/4"	4"
S	NORMAL BOLT SPACING	2 1/2"	3"	3 1/4"	3 1/2"	4"	4 1/2"
BSMIN	MINIMUM SPACING BETWEEN TOP & BOTTOM SETS OF BOLTS	1 1/2"	2 1/4"	2 5/8"	3"	3 3/4"	4"
BSMAX	MAXIMUM BOLT SPACING BETWEEN TOP AND BOTTOM SETS OF BOLTS ON CONNECTION PLATES LESS THAN OR EQUAL TO 3/4" THICK	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
	SPLICE BOLT SPACING (NOT TO EXCEED 2'-0")	1/2 BSMAX (±1/16") WHEN BSMAX = 2'-0 1/16" TO 4'-0 1/3 BSMAX (±1/16") WHEN BSMAX = 4'-0 1/16" TO 6'-0 1/4 BSMAX (±1/16") WHEN BSMAX = 6'-0 1/16" TO 8'-0					
BFCD	STANDARD BOLT-TO-FLANGE CLEARANCE DIMENSION (LARGER ON SLOPES 2:12 AND GREATER)	7/8"	1 1/8"	1 1/4"	1 3/8"	1 5/8"	1 7/8"
TT	THICKNESS TOP FLANGE	REFER TO FRAME PROFILE FOR LARGEST FLANGE THICKNESS EITHER SIDE OF SPLICE					
TB	THICKNESS BOTTOM FLANGE						
YT	BOLT SPACING TOP (MIN = S)	1 3/4" + TT	2 1/4" + TT	2 1/2" + TT	2 3/4" + TT	3 1/4" + TT	3 3/4" + TT
YB	BOLT SPACING BOTTOM (MIN = S)	or TB Sloped	or TB Sloped	or TB Sloped	or TB Sloped	or TB Sloped	or TB Sloped
EED(S)	MINIMUM SHEARED END EDGE DIMENSION	1 1/4"	1 1/4"	1 1/2"	1 3/4"	2 1/4"	2 5/8"
EED(R)	MINIMUM ROLLED END EDGE DIMENSION	3/4"	1"	1 1/8"	1 1/4"	1 5/8"	2 1/4"
EEDK	END EDGE DIMENSION AT KNEE CONNECTION	1 3/8"	1 3/8"	1 5/8"	1 7/8"	2 3/8"	2 3/4"
BCWM	MIN. BOLT CLEARANCE FROM A FLANGE OR WEB WELD — WITHOUT WASHER	7/16"	5/8"	3/4"	13/16"	1"	1 3/8"
	MIN. BOLT CLEARANCE FROM A FLANGE OR WEB WELD — WITH HARDENED WASHER	9/16"	3/4"	7/8"	1"	1 1/4"	1 1/2"
WCSM	MIN. WIDTH OF CONN. PL. (Standard Connection)	5"	6"	8"	8"	10"	12"
WCHM	MIN. WIDTH OF CONN. PL. (Heavy Connection)	N/A	10"	12"	12"	16"	18"
TCMIN	MINIMUM THICKNESS OF	1/4"	3/8"	7/16"	1/2"	5/8"	1"

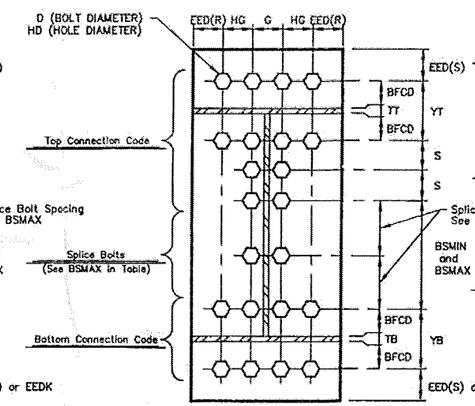
B 4E/2EH
- Connection Code (See "Connection Code Format" on this drawing)
- Connection Location

CROSS SECTION CONNECTION CODE KEY
(AS SHOWN AT CONNECTIONS ON FRAME CROSS SECTION DRAWINGS)

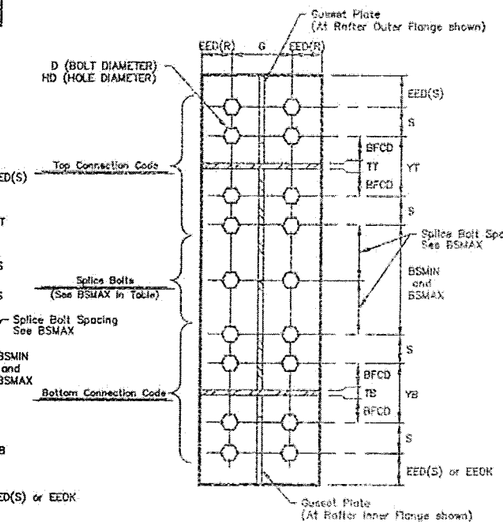
Flange Brace Material Schedule	
Part Mark	Material
FB4_	L 2" x 2" x 14 Ga.
FB5_	L 2" x 2" x 14 Ga.
FB6_	L 2" x 2" x 1/8"
FB7_	L 2 1/2" x 2 1/2" x 1/8"



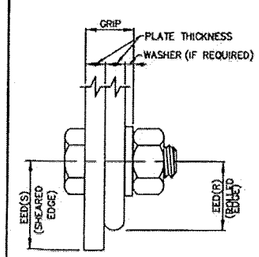
STANDARD CONNECTION DESIGNATION
(CODE 4E/2E SHOWN)



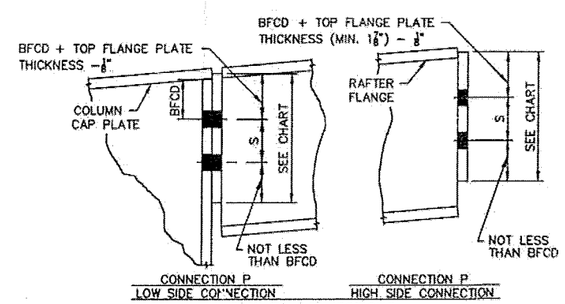
HEAVY CONNECTION DESIGNATION



4X CONNECTION DESIGNATION
(CODE 4X/4X SHOWN)



A325 BOLT EDGE DISTANCE



LEAN-TO CONNECTIONS

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

LEAN-TO BUTT PLATE LENGTH* CHART				
BOLT DIA. \ BOLT QTY.	2	4	6	8
1/2"ø BOLT	6"	6"	7 1/2"	10"
3/4"ø BOLT	6"	6"	9"	1'-0
7/8"ø BOLT	6"	6 1/2"	9 3/4"	1'-1
1"ø BOLT	6"	7"	10 1/2"	1'-2

* NOTE: BUTT PLATE LENGTH MUST BE A MINIMUM OF 1/2 THE RAFTER WEB DEPTH AND SHALL NOT EXCEED RAFTER TOTAL DEPTH.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/23/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
620 Park Street Suite 206, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1969

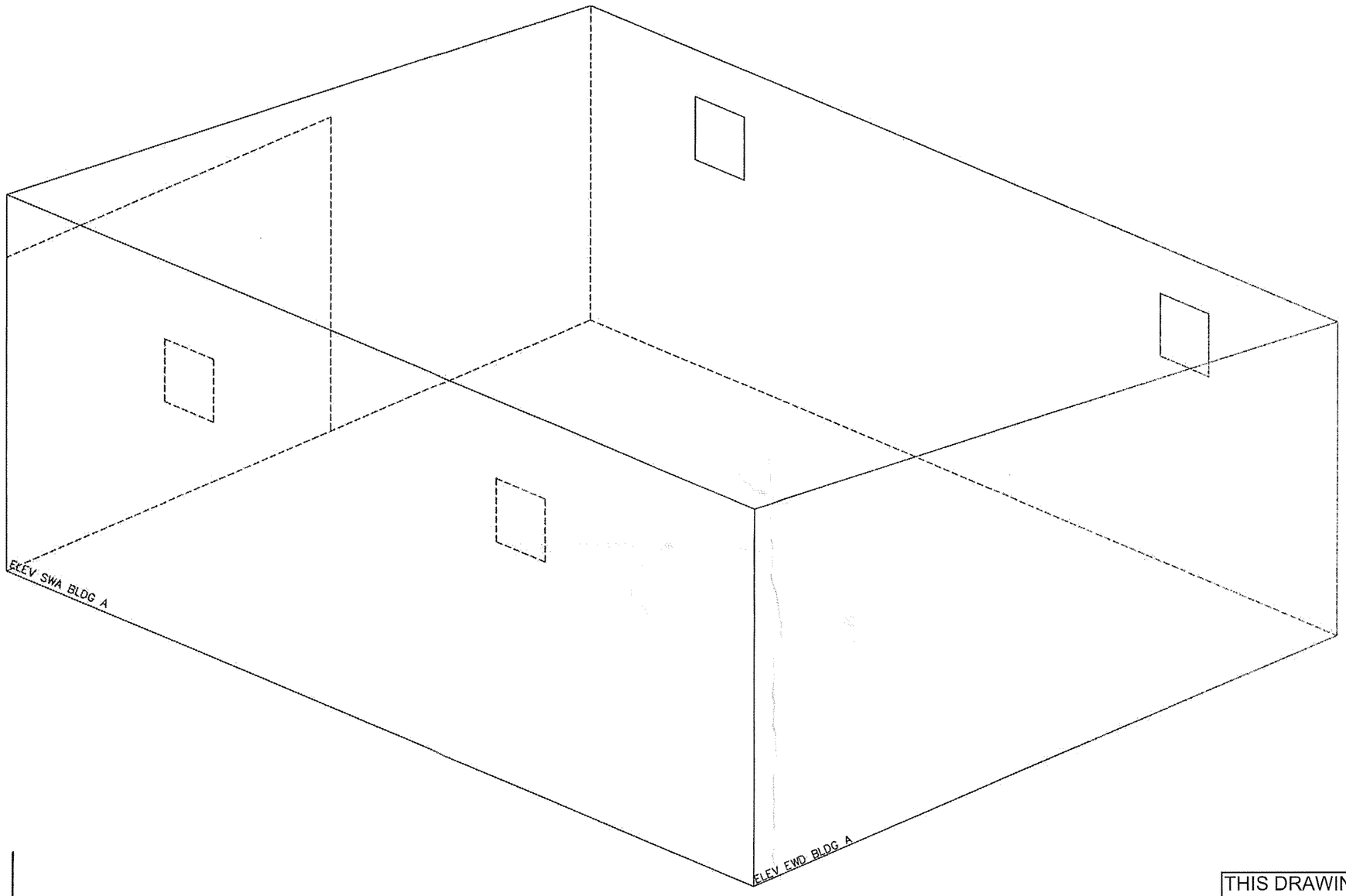
Customer: L.A.SCENSION CONSOLIDATED
8300 LA. HWY 3140
SORRENTO, LA. 707799

Project Name & Location:
MARVIN BRAUND PUMP STATI
8300 LA. HWY 3140
SORRENTO LA 70778

Drawing Status: ☐ Preliminary (Not For Construction) ☒ For Approval (Not For Construction) ☐ For Construction Permit ☐ For Erection Installation

Scale: NOT TO SCALE
Drawn by: DGS 8/3/11
Checked by: ART 8/5/11
Project Engineer: AXW
Job Number: 22-T-55214-1
Sheet Number: E14 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, NCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.



DOWNSPOUT LAYOUT
[4 REQ'D]

FLASHING LAYOUT

THIS DRAWING IS PROVIDED FOR REFERENCE ONLY.

IF REQUESTED, ENGINEERING CERTIFICATION OF MATERIALS SUPPLIED BY THE MANUFACTURER WILL BE PROVIDED BY SEAL AND SIGNATURE OF A LICENSED ENGINEER ON FINAL ERECTION DRAWINGS.

Revision	Date	Description	By	Ck'd
A	08/03/11	FOR APPROVAL	DGS	ART

CONSOLIDATED METAL RESOURCES
326 Park Street Suite 205, Castle Rock, CO 80109-1526
Phone: 303-688-1323 Fax: 303-688-1069

Customer: LASSERSON CONSOLIDATED
EDDY A. WEST #40
SORRENTO, LA. 70778

Project Name & Location:
WAXPIN BRUND PUMP STATI
EDDY A. WEST #40
SORRENTO LA 70778

Drawing Status:
☐ Preliminary
☐ Not For Construction
☐ For Approval
☒ For Construction Permit
☐ For Erection Installation

Scale:	NOT TO SCALE
Drawn by:	DGS 8/3/11
Checked by:	ART 8/3/11
Project Engineer:	AXW
Job Number:	22-T-55214-1
Sheet Number:	E15 of 15

The engineer whose seal appears hereon is an employee for the manufacturer, HCI Groups, Inc. or one of its affiliates, for the materials described herein. Said seal or certification is limited to the products designed and manufactured by manufacturer only. The undersigned engineer is not the overall engineer of record for this project.