AGENDA ITEM EXECUTIVE SUMMARY

Agenda Item:	Water Plant Variable Frequency Drive Installation for Reverse Osmosis Unit #1
Presenter & Title:	Bob VanGyseghem, Superintendent of Water and Wastewater.
Date:	2/11/2020

Please Check Appropriate Box:

X	Committee of the Whole Meeting		Special Committee of the Whole Meeting
X	City Council Meeting		Special City Council Meeting
	Public Hearing		Other -

Associated Strategic Plan Goal/Objective: EMS II

Estimated Cost: $31,570.00	Budgeted? ___ Yes _X__ No	Other Funding? ____ Yes ____ No

Executive Summary:

On June 17, 2019 the variable frequency drive, VFD, that controls pressure through the reverse osmosis unit #1 failed. On July 15, 2019 the City Council approved the purchase of two new Variable Frequency Drives. The new VFD is physically larger in size which requires increasing the size of the concrete pad the unit sits on, and installing new electric conduit and wiring. Plans and specifications were prepared to bid the project. The project was advertised on the City web site and the Daily Herald. Two bids were received with the low bid provided by Frank Marshall Electric in the amount of $28,700.00. Staff is recommending that a 10% contingency be included in the overall not-to-exceed amount to account for any unforeseen field changes that may occur. Any field changes (Change Orders) must be approved by the City Administrator to be applied to the contingency. The cost to install the variable frequency drive will be paid for within the existing budget and be reflected in a future budget amendment if necessary.

Attachments: *(please list)*

- Resolution
- Bid Tabulation

Voting Requirements:

This motion requires __6_ affirmative votes for passage.

The Mayor may vote on three occasions: (a) when the vote of the aldermen or trustees has resulted in a tie; (b) when one half of the aldermen or trustees elected have voted in favor of an ordinance, resolution, or motion even though there is no tie votes; or (c) when a vote greater than a majority of the corporate authorities is required by state statute or local ordinance to adopt an ordinance, resolution, or motion.

Recommendation / Suggested Action: *(how item should be listed on agenda)*

Staff requests that the City Council authorize the City Administrator to enter into a contract with Frank Marshall Electric at a cost of $28,700 and allow the City Administrator to approve up to $2,870.00 in change orders for a total not-to-exceed amount of $31,570.00

RESOLUTION NO. 2020-17

RESOLUTION AUTHORIZING EXECUTION OF
Contract with Frank Marshall Electric

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF GENEVA, KANE COUNTY, ILLINOIS, as follows:

SECTION 1: That the City Administrator is hereby authorized to execute, on behalf of the City of Geneva, a contract with Frank Marshall Electric, for the installation of Variable Frequency Drive at Water Treatment Facility.

SECTION 2: This Resolution shall become effective from and after its passage as in accordance with law.

PASSED by the City Council of the City of Geneva, Kane County, Illinois, this ____ day of _____, 2020

AYES: __ NAYS: __ ABSENT: __ ABSTAINING: __ HOLDING OFFICE: __

Approved by me this ____ day of _____, 2020.

_____
Mayor

ATTEST:

_____
City Clerk

City of Geneva

Summary of Bids

Name of Project: VFD Install

Recorded By: Bob Van Gyseghem

Opened By: Jennifer Milewski

Date/Time: 2/10/2020 10:00 AM

Approved Engineer Estimate/ Budget :

CONTRACTOR NAME	BID PRICE	BID BOND % OF PRICE	TYPE OF PAYMENT FOR BID BOND	REMARKS	ADDENDUM
Frank Marshall Electric	**$28,700.00**	**10%**	**Bond**		
Leyden Electric, Inc.	**$32,500.00**	**10%**	**Bond**		

Contractor's Name:
Address/ City, State:
Telephone:
Fax:

PROJECT NO. 190-19090-00

Contract Documents
For
WATER TREATMENT PLANT VFD REPLACEMENT

2020

MEGAN M. CZACH 062-066052 LICENSED PROFESSIONAL ENGINEER OF ILLINOIS DATE: 1/9/2020 EXP: 11/30/2021	DEUCHLER ENGINEERING CORPORATION 184-001830 PROFESSIONAL DESIGN FIRM CORPORATION STATE OF ILLINOIS AURORA, ILLINOIS DATE: 1/9/2020 EXP: 4/30/2021
MEGAN M. CZACH, P.E. **DEUCHLER ENGINEERING CORP.** PROFESSIONAL ENGINEER 062-066052 RESPONSIBLE FOR ALL DRAWINGS AND SPECIFICATIONS	**DEUCHLER ENGINEERING CORP.** PROFESSIONAL DESIGN FIRM CORPORATION

Deuchler Engineering Corp.
230 Woodlawn Avenue
Aurora, IL 60506

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DIVISION 26 – ELECTRICAL

CITY OF GENEVA
WATER TREATMENT PLANT VFD REPLACEMENT

BIDDING DOCUMENTS

Deuchler Engineering Corp.
190-19090-00

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SECTION 00020

ADVERTISEMENT FOR BIDS

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA
2020

Sealed **Bids** submitted in duplicate in a sealed envelope with the words "Water Treatment Plant VFD Replacement" clearly marked on it, will be received by the City of Geneva, Illinois until **10:00 A.M. Monday, February 10, 2020** at the office of the City Administrator, 22 South First Street, Geneva, IL, 60134 and will be publicly opened and read aloud at that time. The proposed project consists of the removal of two existing variable frequency drives (VFDs) and installation of two new VFDs (already purchased and located on site) along with new wiring, conduit, and associated civil and electrical work for a complete and operational system.

The Contractor and sub-Contractors shall pay not less than the current prevailing wages at the time of the signing of the contract as found by the Department of Labor or as determined by the Court of Appeal, to all his/her employees performing work under the Contract. A signed certification stating the above as well as the fact that the bidder is not barred from bidding as a result of a violation of either Section 33E-3 or 33E-4 of Chapter 38, Illinois Revised Statues, 1987 (as amended) must be submitted by the successful bidder as part of this contract.

A digital copy of Instructions for Bidders, Bid Form, Plans, and Specifications is available of the City of Geneva website: https://www.geneva.il.us/

All **Bids** shall be submitted in accordance with the Instructions for Bidders and shall be accompanied by a **10% Bid** guarantee consisting of a bid bond, as provided for under terms of said Instructions for Bidders and Specifications. Complete instructions for filing Bids are included in the Instructions for Bidders.

The City reserves the right to reject any or all **Bids** and waive technicalities.

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SECTION 00100

INSTRUCTIONS FOR BIDDERS

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA
2020

Certain additional terms used in these Instructions for Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

Bidder - one who submits a Bid directly to Owner as distinct from a sub-bidder, who submits a bid to a Bidder.

Issuing Office - the office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

Successful Bidder - the lowest, responsible and responsive Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

Article 1. Qualifications of Bidders

1.1 To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five days after Bid opening, upon Owner's request, detailed written evidence such as financial data, previous experience, present commitments, and other such data as may be called for. **Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.**

The investigation of a Bidder will seek to determine whether the organization is adequate in size, has had previous experience and whether available equipment and financial resources are adequate to assure Owner that the Work will be completed in accordance with the terms of the Agreement. The amount of other work to which the Bidder is committed may also be considered.

1.2 In evaluating Bids, Owner will consider the qualifications of only those Bidders whose Bids are in compliance with the prescribed requirements.

1.3 Owner reserves the right to reject any Bid if the evidence submitted by, or the investigation of, such Bidder fails to satisfy Owner that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the Work contemplated therein.

1.4 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 or

equipment) proposed for those portions of the Work as to which the identity of Subcontractors and other persons and organizations must be submitted as described herein.

Article 2. Copies of Contract Documents

2.1 Complete sets of Contract Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

2.2 The Owner and Engineer, in making copies of Contact Documents available, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

Article 3. Examination of Contract Documents and Site

3.1 Before submitting a Bid, each Bidder must (a) examine the Contract Documents, including Addenda, thoroughly, (b) visit the project sites to become familiar with local conditions that may in any manner affect cost, progress or performance of the work, (c) become familiar with Federal, State and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work, (d) study and carefully correlate Bidder's observations with the requirements of the Contract Documents, and (e) satisfy themselves of the accuracy of the estimated quantities in the Bid Schedule.

3.2 Before submitting a Bid, Bidders may, at their own expense, make such investigations and tests as they may deem necessary to determine their Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

3.3 On request, Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for the submission of a Bid.

3.4 The lands upon which the work is to be performed, rights-of-way for access thereto and other lands designated for use by Contractor in performing the work are identified in the Specifications, Special Provisions or on the Drawings.

3.5 The submission of a Bid will constitute an incontrovertible representation that the Bidder has complied with every requirement of this Article 3 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the Work.

Article 4. Interpretations

4.1 All questions about the meaning or intent of the Contract Documents shall be received in writing by Deuchler Engineering Corporation, 230 Woodlawn Avenue, Aurora, Illinois, 60506 (Fax: 630/897-5696), at least five (5) days before the date set herein for the opening of bids. Questions received by the Engineer less than five (5) business days prior to the date for opening of Bids will not be answered.

4.2 Written clarifications or interpretations will be issued by Addenda not later than two days before the bid opening date. Only questions answered by formal written Addenda will be binding. Oral and other clarifications or interpretations will be without legal effect. Addenda will be sent by delivery service with return receipt requested or by FAX, to all parties recorded as having received the Contract Documents.

4.3 Bidders are responsible for determining that they have received all Addenda issued.

Article 5. Bid Security

5.1 Each Bidder shall deposit with his Bid a Bid guarantee consisting of a **bid bond** executed by the Bidder in an amount not less than **10%** of the total amount of the Bid submitted. Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located. The bid security shall act as a guarantee that in case the Bidder's proposal is accepted, the Bidder shall within ten (10) days after the date of such acceptance and notification thereof, deliver to the Owner a contract signed and executed by the Contractor and a responsible bonding company acceptable to and written upon forms prepared or approved by the Owner.

Article 6. Bid Form

6.1 Each Bid shall be submitted on the Bid Form on the pages included in the Contract Documents. The Bid Form must be submitted on the color paper provided in the Contract Documents: blue paper for Section 00300, pink paper for the bid security. The remainder of Items 3-4 listed in the Bidder's Checklist on page 9 of Section 00100 may be submitted on white paper. The Bid Form shall be removed and submitted separately. All blank spaces for Bid prices must be filled in with the unit price of the item or the lump sum for which the Bid is made.

6.2 Bid Forms shall be completed in ink or by typewriter. The Bid price of each item on the form shall be stated in figures.

6.3 Bids by corporations shall be executed in the corporate name by the president or a 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 corporate address and state of incorporation shall be shown below the signature.

6.4 Bids by partnership shall be executed in the partnership name and signed by a partner, whose title shall appear under the signature. The official address of the partnership shall be shown below the signature.

6.5 All names shall be typed or printed below the signature.

6.6 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

6.7 The address to which communications regarding the Bid are to be directed shall be shown.

6.8 A Bid which includes for any item a Bid Price that is abnormally low or high may be rejected as unbalanced.

6.9 A conditional or qualified Bid will not be accepted.

Article 7. Receipt of Bids

7.1 Sealed Bids will be received by the City of Geneva, Illinois, on the 10th day of February, 2020, up to the hour of 10:00 o'clock A.M., Prevailing Time, and then at said office PUBLICLY OPENED AND READ ALOUD.

7.2 Each Bid must be submitted in a sealed envelope addressed to Ms. Stephanie Dawkins, City Administrator, City of Geneva. Each sealed envelope containing a Bid must be plainly marked on the outside as "**Water Treatment Plant VFD Replacement**", and the envelope should bear on the outside the name of the Bidder and their address. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope, addressed to the City Administrator at 22 South First Street, Geneva, Illinois 60134.

7.3 Owner may consider informal any Bid not prepared and submitted in accordance with the provisions hereof.

7.4 Bidders are cautioned that it is the responsibility of each individual bidder to assure that their bid is in the possession of the responsible official, or the designated alternate, prior to the stated time and at the place of the Bid Opening. Owner is not responsible for bids delayed by mail and/or delivery services, of any nature.

Article 8. Modification and Withdrawal of Bids

8.1 Bids may be modified only 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 opening of Bids.

8.2 Bids may be withdrawn prior to the scheduled time (or authorized postponement thereof) for the opening of Bids.

8.3 Any Bid received after the time and date specified shall not be considered. No Bid may be withdrawn for a period of 90 days after the actual date of the opening of the Bids. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder.

8.4 If the Bidder modifies, limits, restricts or subjects his Bid to conditions that would change the requirements of the Plans and Specifications, this would be considered a conditional or qualified bid and the Bid will not be accepted.

Article 9. Performance, Payment and Other Bonds

9.1 A Performance Bond and a Payment Bond, each in the amount of 100 percent of the Contract Price, with a corporate surety approved by the Owner will be required for the faithful performance of the contract.

9.2 All Bonds required as Contract Security shall be furnished with the executed Agreement.

9.3 Attorneys-in-fact who sign Payment Bonds and Performance Bonds must file with each Bond a certified and effective dated copy of their power of attorney.

Article 10. Award of Contract

10.1 The Contract will be awarded to the lowest responsive, responsible and eligible Bidder (Successful Bidder) for the project determined by the Owner to be in the Owner's best interest.

Responsive Bidders will provide bids for the unit or lump sum price for each item set forth on the Bid Form, and for each alternate project feature addition. Responsive Bidders may also provide bids for each alternate equipment manufacturer listed as described in the Bid Form and selected by the Bidder.

The term "lowest responsive, responsible and eligible Bidder" as used herein shall mean the Bidder whose Bid is the lowest of those Bidders possessing the skill, ability and integrity necessary to the faithful performance of the Work, and submits a Bid meeting all requirements.

10.2 The Contract will be awarded on the basis of material and equipment described in the Contract Documents without consideration of possible substitute or "or equal" items. Whenever it is indicated in the Contract Documents that a substitute or "or equal" item of material or equipment may be furnished or used by the Bidder, if acceptable to the Engineer, application for such acceptance will not be considered by the Engineer until after the "effective date of the Agreement."

10.3 Owner reserves the right to reject any and all Bids, to waive any and all informalities if it is in Owner's best interest to do so, and the right to disregard all nonconforming, nonresponsive or conditional Bids.

10.4 Owner also reserves the right to reject the Bid of any Bidder that Owner considers to be unqualified relative to Article 1 above.

10.5 If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within 5 days, after the actual date of the opening of the Bids.

10.6 The party to whom the contract is awarded will be required to execute the Agreement and obtain the Performance Bond, Payment Bond, and required insurance within ten (10) calendar days from the date of when the Notice of Award is delivered to the Bidder. The Notice of Award shall be accompanied by the necessary Agreement and Bond forms.

Article 11. Execution of Agreement

11.1 When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by at least five unsigned copies of the Agreement and all other applicable Contract Documents. Within 5 days, excluding Saturdays, Sundays and legal holidays, after the date of receipt of such notification Contractor shall execute and return all copies of the Agreement and all other applicable Contract Documents to Owner.

11.2 The Owner within ten (10) days after receipt of acceptable Performance Bond, Payment Bond, required insurance, and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the Owner not execute the Agreement within such period, the Bidder may send Written Notice to withdraw their signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

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

11.4 In case of failure of the Bidder to execute and provide all agreements, bonds and insurance as required by the Contract Documents, the Owner may at their option consider the Bidder in default, and the amount of the security submitted with the Bid shall be forfeited as liquidated damages. However, nothing shall be construed herein to prevent the Owner from electing to claim and prove damages in excess of the bid security.

11.5 Because time is of the essence regarding the work under this contract, the Contractor shall initiate work within 10 days of the receipt of the Notice to Proceed by the Contractor.

Article 12. Safety and Health Regulations

12.1 This project is subject to the Safety and Health Regulations (CFR 29, Part 1926 and all subsequent amendments) as promulgated by the U.S. Department of Labor on June 24, 1974 and CFR 29, Part 1910, General Industry Safety and Health Regulations Identified as Applicable to Construction.

12.2 The Successful Bidder shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54).

12.3 The Successful Bidder shall have a competent person or persons, as required under the Occupational Safety and Health Act on the Site to inspect the work and to supervise the conformance of the Work with the regulations of the Act.

Article 13. Prevailing Wages for Kane County

13.1 The prevailing wage rates from Kane County, Illinois shall apply.

Article 14. Nondiscrimination in Employment

14.1 Contracts for work under this Project will obligate the Contractor and Subcontractors not to discriminate in employment practices.

14.2 The Contractor assures the Owner that they are an "Equal Opportunity Employer" as defined by Federal and State laws and regulations and agrees to comply with the Illinois Employment Practice Commission Equal Opportunity Clause as required by Article II of the Illinois FEPC Rules and Regulations, which is considered to be part of any contract or purchase agreement.

14.3 The Contractor certifies that the firm has a written sexual harassment policy defining sexual harassment as required in Section 2-105 of the IL. Human Rights Act 775 ILCA 5/1-105 et.seq.

Article 15. State Sales Tax

15.1 Sales tax will not have to be paid on equipment and material purchased for this project.

Article 16. Liquidated Damages

16.1 Provisions for Liquidated Damages are set forth in the Agreement

Article 17. General

17.1 The Contract Documents contain the provisions required for the construction of the Project. Information obtained from an officer, agent, employee of the Owner, or any other person shall not affect the risks or obligations assumed by the Contractor, or relieve them from fulfilling any of the conditions of the Contract.

17.2 The low Bidder shall submit the names of the major subcontractors (contracts in excess of $5,000). Failure to comply with this requirement may make the Bidder non-responsive as determined by the Owner. The Owner shall receive the list of the subcontractors by 2:00 P.M., prevailing time, on the day after Bids are received by the Owner, at the offices of the Engineer, Deuchler Engineering Corporation, 230 Woodlawn Avenue, Aurora, IL 60506; FAX (630) 897-5696.

17.3 Certification that Contractor is not barred from public contracting due to bid-rigging or bid rotation convictions must accompany the Bid.

17.4 The lands upon which the work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are

identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by the Contractor.

17.5 **Attached is a checklist of items that must be submitted with the Bid.**

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA
2019

Bidder's Checklist of Items to Assist with Bid Submittal

1. **Bid Security**: 10% of the Bid, attach to last page of Bid Form Section 00300

2. **Completed Bid Form**

1. All names filled in appropriate blanks.
2. Acknowledge receipt of Addenda.
3. Price Schedule filled out.
4. Bid Signed by Officers.

3. **Completed Sections 00310, 00315, 00320**

a. Drug Free Workplace Certification – Section 00310
b. Certification of Compliance with Safety Regulations – Section 00310
c. Certification of No Tax Delinquency and No Tax Default – Section 00310
d. Certification of Compliance with Sexual Harassment Policies – Section 00310
e. Certification of Non-Segregated Facilities – Section 00310
f. Anti-Bid Rigging Certification – Section 00315
g. Certification of Debarment, Suspension and Other Responsibility Matters – Section 00320

4. **Completed Affidavit of Experience Section 00330**

5. **List of Subcontractors by 2:00 p.m. the day after receipt of bids, Section 00300 - Page 6**

6. **Completed Affidavit of Litigation History Section 00335**

END OF SECTION

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SECTION 00300

BID FORM

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA
2020

Proposal of FRANK MARSHALL ELECTRIC
(hereinafter called "BIDDER"), organized and existing under the laws of the State of Illinois, doing business as CORPORATION (insert "A Corporation," "A Partnership," or "An Individual," as applicable) to the City of Geneva (hereinafter called "Owner").

I. The undersigned BIDDER proposes and agrees, if this bid is accepted, to enter into an agreement with the Owner in the form in the Bidding Documents to perform and furnish all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

II. BIDDER accepts all of the terms and conditions of the Advertisement for Bids and Instructions for Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that BIDDER may agree to in writing upon request of Owner.

III. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

A. BIDDER has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date

B. BIDDER has visited the site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, performance, and furnishing of the Work.

C. BIDDER is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. BIDDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site. BIDDER acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information or data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the Site.

E. BIDDER is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Bidding Documents.

F. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

G. BIDDER has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that BIDDER has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to BIDDER.

H. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

IV. By submission of the bid, each BIDDER further certifies, and in the case of a joint bid each party thereto certifies as to his own organization, that in connection with the bid:

A. The prices in the bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

B. Unless otherwise required by law, the prices which have been quoted in the bid have not knowingly been disclosed by the bidder, prior to opening, directly or indirectly to any other bidder or competitor; and

C. No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition.

V. Each person signing the Bid certifies that:

A. They are the person in the BIDDER's organization responsible within that organization for the decision as to the prices being bid and that he has not participated, and will not participate, in any action contrary to (4) above; or

B. They are not the person in the BIDDER's organization responsible within that organization for the decision as to the prices being bid, but that they have been authorized to act as an agent for the persons responsible for such decision in certifying that such persons have not participated, and will not participate, in any action contrary to (4) above, and as their agent shall so certify; and shall also certify that he has not participated, and will not participate, in any action contrary to (4) above.

VI. BIDDER does hereby propose to furnish all labor, services, materials, supplies, equipment, apparatus, appliances, and to do all work and pay all costs and expenses connected therewith required to construct this project complete in place in accordance with the documents named in the foregoing paragraph, on the basis of the quantities of work and services actually performed and for the unit and lump sum prices for the several classifications of work stated herein below, which said unit and lump sum prices are as follows:

TWENTY EIGHT THOUSAND SEVEN HUNDRED **Dollars**
(use words)

and ZERO **Cents**
(use words)

$ 28,700.00
Total Base Bid (figures)

NOTES:

1. OWNER RESERVES THE RIGHT TO DELETE ANY BID ITEMS WHICH ARE NOT IN THE BEST INTEREST OF THE OWNER. THE OWNER ALSO HAS THE RIGHT TO REDUCE ANY QUANTITIES IN ORDER TO KEEP THE PROJECT UNDER THE BUDGETED VALUE FOR THE FISCAL YEAR.

2. **BIDDER agrees that the Work will be Substantially Complete 60 Days after the Notice to Proceed and will meet Final Completion 90 Days after the Notice to Proceed.**

3. BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

4. The Owner reserves the right to reject all Bids.

5. Accompanying this Bid is a Bid Security in the amount of $ 2,870.00, which is hereby tendered in accordance with the requirements of the Instructions to Bidders and the Specifications.

6. In the event that this Bid is accepted and an award of contract is made to the undersigned

BIDDER, the undersigned does hereby covenant and agree to deliver to the Owner the signed and executed Contract and Bonds as specified in the Instructions for Bidders and the Specifications.

7. The undersigned further agrees to begin work within ten (10) days after the executions and acceptance of the Contract, and thereafter to carry on the work diligently and continuously in such manner as to insure final completion and delivery to the Owner of the entire work or equipment under contract in accordance with the provisions of the Contract.

Witness ed Hand(s) and Seal ed this 10th day of FEBRUARY, 2020.

If an individual, sign and give address

_____

Address_____

If a partnership, sign all individual names and give address of each partners

_____

_____
Partnership Name

Address_____

Name and Addresses of Individual Partners

_____

_____

_____

_____

If a corporation, officers duly authorized should sign, attach corporate seal

Corporate Name
FRANK MARSHALL ELECTRIC

Address 1043 OLIVER AVENUE
AURORA, IL 60506

By _____

Attest:

_____
Secretary

Corporate Seal

Subcontracted Work

To be submitted the day after Bids are received by 2:00 p.m., prevailing time, to the Engineer, Deuchler Engineering Corp., 230 Woodlawn Avenue, Aurora, IL.

The following subcontractors will be utilized for portions of the project work. **Changes shall not be made subsequent to the Bid unless change(s) is approved by the Owner.**

Subcontractor	Work to be Performed	Estimated Dollar Amount
DON BOHR & SONS	CONCRETE PAD	$1,850.00

ATTACH BID SECURITY TO THIS PAGE USING A PAPER CLIP.

THE AMERICAN INSTITUTE OF ARCHITECTS

AIA Document A310
Bid Bond

KNOW ALL MEN BY THESE PRESENTS, THAT WE Frank Marshall Electric Midwest, LLC.
1043 Oliver Avenue Aurora, IL 60506
as Principal, hereinafter called the Principal, and Employers Mutual Casualty Company
P.O. Box 712 Des Moines, IA 50306-0712
a corporation duly organized under the laws of the State of IA
as Surety, hereinafter called the Surety, are held and firmly bound unto City of Geneva
22 South First Street Geneva, IL 60134
as Obligee, hereinafter called the Obligee, in the sum of Ten Percent of Amount Bid
Dollars ($ 10%),
for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for Water Treatment Plant VFD Replacement

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and materials furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this 10th day of February , 2020

(Witness)

Frank Marshall Electric Midwest, LLC.
(Principal) (Seal)
By: MANAGING MEMBER
(Title)

(Witness)

EMPLOYERS MUTUAL CASUALTY CO. CORPORATE SEAL DES MOINES, IOWA

Employers Mutual Casualty Company
(Surety) (Seal)
By:
Attorney-in-Fact William P. Maher (Title)

G-23208-B ss.

STATE OF Illinois

COUNTY OF Cook

I, Laura Dohn Notary Public of Cook County, in the State of Illinois, do hereby certify that William P. Maher Attorney-in-Fact, of the Employers Mutual Casualty Company who is personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person, and acknowledged that he signed, sealed and delivered said instrument, for and on behalf of the Employers Mutual Casualty Company for the uses and purposes therein set forth.

Given under my hand and notarial seal at my office in the City of Palatine in said County, this 10th day of February A.D., 2020

Notary Public Laura Dohn

My Commission expires: September 21, 2020

OFFICIAL SEAL
LAURA DOHN
NOTARY PUBLIC, STATE OF ILLINOIS
My Commission Expires Sep 21, 2020

P.O. Box 712 • Des Moines, Iowa 50306-0712

EMC INSURANCE

CERTIFICATE OF AUTHORITY INDIVIDUAL ATTORNEY-IN-FACT

KNOW ALL MEN BY THESE PRESENTS, that:

1. Employers Mutual Casualty Company, an Iowa Corporation
2. EMCASCO Insurance Company, an Iowa Corporation
3. Union Insurance Company of Providence, an Iowa Corporation
4. Illinois EMCASCO Insurance Company, an Iowa Corporation
5. Dakota Fire Insurance Company, a North Dakota Corporation
6. EMC Property & Casualty Company, an Iowa Corporation

hereinafter referred to severally as "Company" and collectively as "Companies", each does, by these presents, make, constitute and appoint:

William P. Maher

its true and lawful attorney-in-fact, with full power and authority conferred to sign, seal, and execute the following Surety Bond:

Surety Bond Number: Bid Bond
Principal : Frank Marshall Electric Midwest, LLC.
Obligee : City of Geneva

and to bind each Company thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of each such Company, and all of the acts of said attorney pursuant to the authority hereby given are hereby ratified and confirmed.

AUTHORITY FOR POWER OF ATTORNEY

This Power-of-Attorney is made and executed pursuant to and by the authority of the following resolution of the Boards of Directors of each of the Companies at the first regularly scheduled meeting of each company duly called and held in 1999:

RESOLVED: The President and Chief Executive Officer, any Vice President, the Treasurer and the Secretary of Employers Mutual Casualty Company shall have power and authority to (1) appoint attorneys-in-fact and authorize them to execute on behalf of each Company and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof; and (2) to remove any such attorney-in-fact at any time and revoke the power and authority given to him or her. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power-of-attorney issued to them, to execute and deliver on behalf of the Company, and to attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and any such instrument executed by any such attorney-in-fact shall be fully and in all respects binding upon the Company. Certification as to the validity of any power-of-attorney authorized herein made by an officer of Employers Mutual Casualty Company shall be fully and in all respects binding upon this Company. The facsimile or mechanically reproduced signature of such officer, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power-of-attorney of the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS THEREOF, the Companies have caused these presents to be signed for each by their officers as shown, and the Corporate seals to be hereto affixed this 1st day of July, 2018.

Seals

SEAL — EMCASCO INSURANCE COMPANY — CORPORATE — IOWA
1863 — UNION INSURANCE COMPANY OF PROVIDENCE — INCORPORATED — IOWA
1953 — EMC PROPERTY & CASUALTY CO. — INCORPORATED — IOWA
SEAL — EMCASCO INSURANCE COMPANY — CORPORATE — IOWA
SEAL — DAKOTA FIRE INSURANCE COMPANY — CORPORATE — NORTH DAKOTA
SEAL — EMPLOYERS MUTUAL CASUALTY CO. — CORPORATE — DES MOINES, IOWA

Bruce G. Kelley, CEO, Chairman of Companies 2, 3, 4, 5 & 6; President of Companies 1, 2 & 6; Treasurer of Companies 1, 2, 3, 4 & 6

Todd Strother, Senior Vice President

On this 1st day of July, 2018 before me a Notary Public in and for the State of Iowa, personally appeared Bruce G. Kelley and Todd Strother, who, being by me duly sworn, did say that they are, and are known to me to be the CEO, Chairman, President and Treasurer, and/or Senior Vice President, respectively, of each of the Companies above; that the seals affixed to this instrument are the seals of said corporations; that said instrument was signed and sealed on behalf of each of the Companies by authority of their respective Boards of Directors; and that the said Bruce G. Kelley and Todd Strother, as such officers, acknowledged the execution of said instrument to be their voluntary act and deed, and the voluntary act and deed of each of the Companies.

NOTARIAL SEAL IOWA — KATHY LOVERIDGE Commission Number 780769 My Commission Expires October 10, 2022

My Commission Expires October 10, 2022.

Kathy Loveridge
Notary Public in and for the State of Iowa

CERTIFICATE

I, James D. Clough, Vice President of the Companies, do hereby certify that the foregoing resolution of the Boards of Directors by each of the Companies, and this Power of Attorney issued pursuant thereto on 1st day of July, 2018, are true and correct and are still in full force and effect.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 10th day of February, 2020.

Vice President

"For verification of the authenticity of the Power of Attorney you may call (515) 345-2689."

SECTION 00310

GENERAL CERTIFICATIONS

The undersigned, as duly-authorized representative of the Contractor, hereby certifies to the City of Geneva, that regarding this project known as **WATER TREATMENT PLANT VFD REPLACEMENT.**

The Following General Certifications are required:

- **Drug Free Workplace Certification**
- **Certification of Compliance with Safety Regulations**
- **Certification of No Tax Delinquency and No Tax Default**
- **Certification of Compliance with Sexual Harassment Policies**
- **Certification of Non-Segregated Facilities**

---

1. DRUG FREE WORKPLACE CERTIFICATION

The Contractor ensures that they operate a drug free environment and that drugs are not allowed in the workplace or satellite locations as well as City of Geneva project locations in accordance with the Drug Free Workplace Act of January, 1992.

2. CERTIFICATION OF COMPLIANCE WITH SAFETY REGULATIONS

The Contractor is fully aware of and able to comply with all Local, State, and Federal Safety and other Laws, Codes, and Regulations applicable for the construction of the Project.

3. CERTIFICATION OF NO TAX DELIQUENCY AND NO TAX DEFAULT

The Contractor is not currently delinquent in the payment of any tax administered by or owed to the Illinois Department of Revenue, or otherwise in default upon any such tax as defined under 65 ILCS 5/11-42.1-1, or if it is:

a. It is contesting its liability for the tax or the amount of tax in accordance with procedures established by the appropriate Revenue Act; or
b. It has entered into an agreement with the Department of Revenue for payment of all taxes due and is currently in compliance with that agreement.

4. CERTIFICATION OF COMPLIANCE WITH SEXUAL HARASSMENT POLICIES

The Contractor has a written sexual harassment policy in place in full compliance with all applicable state and local laws and policies.

5. CERTIFICATION OF NON-SEGREGATED FACILITIES

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term 'segregated facilities' means any waiting rooms, work areas, restrooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom or otherwise. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certification in his files.

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Subscribed and sworn to:

Notary Public

OFFICIAL SEAL
BRUCE C ANDERSON
NOTARY PUBLIC, STATE OF ILLINOIS
DU PAGE COUNTY
MY COMMISSION EXPIRES 04/27/2023

before me this 10TH day of FEBRUARY, 2020.

ADAM MARSHALL
Authorized Agent of Contractor

MANAGING MEMBER
Title

FRANK MARSHALL ELECTRIC
Company

2/10/20
Date

SECTION 00315

CERTIFICATION OF COMPLIANCE WITH CRIMINAL CODE OF 1961

WHEREAS, a conviction for the offense of bid-rigging or bid rotating bars a person or entity from bidding on public contracts (720 ILCS 5/33D-11), and

WHEREAS, Section 33E-11 of the Criminal Code (720 ILCS 5/33E-11) requires bidders and contractors to certify on a form provided by the unit of local government or school district that they are not barred from public contracting due to bid-rigging or bid rotating convictions.

I, ADAM MARSHALL, do hereby certify that:
Name

1. I am MANAGING MEMBER of the FRANK MARSHALL ELECTRIC
Position Firm

and have authority to execute this certification on behalf of the firm;

2. This firm is not barred from bidding on or entering into public contracts due to having been convicted of bid-rigging or bid rotating under paragraphs 720 ILCS 5/33E-11 of the Illinois Criminal Code. The undersigned also certifies that no officers or employees of the bidder or contractor have been so convicted and that the bidder or contractor is not the successor company or a new company created by the offices or owners of one so convicted. It is further certified that any such conviction occurring after the date of this certification will be reported to the above named public body, in writing, with seven (7) days of such conviction, if it occurs during any bidding process, contract term or otherwise prior to entering into any contract therewith.

Name of Firm FRANK MARSHALL ELECTRIC

Signature

Title MANAGING MEMBER

Date 2/10/20

Corporate Seal (where appropriate)

On this 10TH day of FEBRUARY, 2020, before me appeared (Name) ADAM MARSHALL to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by FRANK MARSHALL ELECTRIC (Name of Firm) to execute the affidavit and did so as his or her free act and deed.

Notary Public _____ Commission Expires

Notary Seal

OFFICIAL SEAL
BRUCE C ANDERSON
NOTARY PUBLIC, STATE OF ILLINOIS
DU PAGE COUNTY
MY COMMISSION EXPIRES 04/27/2023

SECTION 00330

AFFIDAVIT OF EXPERIENCE

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA
2019

STATE OF ILLINOIS)
)SS
COUNTY OF KANE)

_____, hereinafter called Principal, Corporation, Partnership or Individual and which has done work for the following parties of the general kind and approximate magnitude under this contract:

Name of Owner	Phone #	Job Description	$ Amount
CITY OF GENEVA		WWTP IMPROVEMENT	1,700,000.00
FOX METRO		NORTH IMPROVEMENT	570,000.00
YORKVILLE SANITARY		PHOSPHOROS & MABR	450,000.00
SUNCAST		WAREHOUSE SERVICES	1,290,000.00

and that _____ (Name of said Principal, Corporation, Partnership or Individuals) available for immediate use on the proposed work the following plant and equipment:

CERTIFICATION:

CONTRACTOR

BY: _____

NAME: ADAM MARSHALL **(PRINCIPAL)**

TITLE: MANAGING MEMBER

ADDRESS: 1043 OLIVER AVENUE AURORA, IL 60506

CONTRACTORS CORPORATE SEAL

OFFICIAL SEAL
BRUCE C ANDERSON
NOTARY PUBLIC, STATE OF ILLINOIS
DU PAGE COUNTY
MY COMMISSION EXPIRES 04/27/2023

ATTEST

BY: _____

NAME: BRUCE ANDERSON **(NOTARY PUBLIC)**

ADDRESS: 1043 OLIVER AVENUE AURORA, IL 60506

SECTION 00335
AFFIDAVIT OF LITIGATION HISTORY

SOUTH STREET SANITARY SEWER REPAIRS ✓
CITY OF GENEVA
2019

STATE OF ILLINOIS)
)SS
COUNTY OF KANE)

I, ADAM MARSHALL, on oath state that the information presented below is a complete accounting of the last ten years of litigation history for the Contractor:

YEAR	CASE/ DOCKET NUMBER	COURT OF JURISDICTION	INDICATE IF CONTRACTOR WAS PLAINTIFF OR DEFENDANT	INDICATE THE NAME OF THE OPPOSING PARTY or PARTIES	DISPOSITION OFCASE INDICATE MONETARY AWARD TO PLAINTIFF/ DEFENDANT / OR SETTLEMENT OR CURRENTLY 'ON-GOING'

Add Additional pages if necessary.

CERTIFICATION:

CONTRACTOR
BY: _____
(PRINCIPAL)

NAME: ADAM MARSHALL

TITLE: MANAGING MEMBER

ADDRESS 1043 OLIVER AVENUE AURORA, IL 605046

CONTRACTOR CORPORATE SEAL

ATTEST
BY: _____
(PRINCIPAL SECRETARY)

NAME: ADAM MARSHALL

TITLE: MANAGING MEMBER

ADDRESS: 1043 OLIVER AVENUE AURORA, IL 605046

SUBSCRIBED AND SWORN TO
Before me this 10TH day of
FEBRUARY, 2020.

_____
Notary Public

OFFICIAL SEAL
BRUCE C ANDERSON
NOTARY PUBLIC, STATE OF ILLINOIS
DU PAGE COUNTY
MY COMMISSION EXPIRES 04/27/2023

END OF SECTION

AGREEMENT AND BONDS

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SECTION 00400

AGREEMENT

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA
2020

This Agreement, made this 2nd day of March, 2020 by and between the City of Geneva, hereinafter called "Owner", and Frank Marshall Electric doing business as a Corporation, hereinafter called "Contractor."

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

1. The Contractor will commence and complete the construction of the **Water Treatment Plant VFD Replacement.**

2. The Contractor will furnish all of the material, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the Project described herein.

I. The Contractor will commence the work required by the Contract Documents within ten (10) calendar days after the date of the Notice to Proceed. The Contractor will Substantially Complete the Work **60 Days** after the Notice to Proceed and will meet Final Completion **90 Days** after the Notice to Proceed, unless the period for completion is extended otherwise by the Contract Documents.

4. The Contractor agrees to perform all of the Work described in the Contract Documents and comply with the terms therein for the sum of $28,700.00 as shown in the Bid Form - Section 00300.

5. The term "Contract Documents" means and includes the following:
   - A. Advertisement for Bids
   - B. Instructions for Bidders
   - C. Bid Form
   - D. This Agreement
   - E. Notice of Award
   - F. Notice to Proceed
   - G. Change Order Form
   - H. Performance Bond
   - I. Payment Bond
   - J. Certificates of Insurance
   - K. Certifications (various)
   - L. Specifications prepared or issued by Deuchler Engineering Corp.
   - M. Drawings prepared by Deuchler Engineering Corp.

N. Addenda:
No._____, dated _____, 2020
No._____, dated _____, 2020
No._____, dated _____, 2020
No._____, dated _____, 2020
No._____, dated _____, 2020

O. Any modification, including Change Orders, duly delivered after execution of Agreement.

6. The Owner will pay to the Contractor in the manner and at such times as set forth in the Special Provisions, such amounts as required by the Contract Documents.

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

8. Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in paragraph 3 above, plus any extensions thereof allowed in accordance with the Contract Documents. The Contractor also recognizes the difficulties involved in proving the actual loss suffered by the Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Contractor shall pay the cost of engineering time, construction observation time, construction management time and any other costs associated with such delay for each day that expires after the time specified in paragraph 3 for Substantial Completion until the work is substantially complete. After Substantial Completion, if contractor shall neglect, refuse or fail to complete the remaining Work within the time specified in paragraph 3 for completion and readiness for final payment, contractor shall pay the cost of engineering time, construction observation time, construction management time and any other costs associated with such delay for each day that expires after the time specified in paragraph 3 for completion and readiness for final payment.

In witness whereof, the parties hereto have executed or caused to be executed by their duly authorized officials this Agreement in **quintuplicate** each of which shall be deemed an original on the date first above written.

Owner:

City of Geneva

By: _____

Name: Stephanie Dawkins

(Seal)

Title: **City Administrator**

Attest:

Name: _____

Title: CITY CLERK

Contractor: FRANK MARSHALL ELECTRIC

By: _____

Name: ADAM MARSHALL

(Seal)

Title: MANAGING MEMBER

Attest:

Name: _____

Title: PARTNER

OFFICIAL SEAL
BRUCE C ANDERSON
NOTARY PUBLIC, STATE OF ILLINOIS
DU PAGE COUNTY
MY COMMISSION EXPIRES 04/27/2023

SECTION 00410

NOTICE OF AWARD

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA
2020

To: FRANK MARSHALL ELECTRIC
1043 Oliver Avenue
Aurora, IL 60506

Date: March 2, 2020

The Owner has considered the Bid submitted by you for the above described **WORK** in response to its Advertisement for Bids and Instructions for Bidders.

You are hereby notified that your Bid has been accepted in the amount of $ 28,700.00 .

You are required by the Instructions for Bidders to execute the Agreement and furnish the required Contractor's Performance Bond, Payment Bond, and certificates of insurance within ten (10) calendar days from the date of this Notice of Award to you.

If you fail to execute said Agreement and to furnish said Bonds and certificates of insurance within ten (10) days from the date of this Notice of Award, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

City of Geneva

NAME: Robert VanGyseghem

TITLE: Superintendent of Water & Wastewater

DATE: March 2, 2020

ACCEPTANCE OF NOTICE

Receipt of the above **NOTICE TO AWARD** is hereby acknowledged:

CONTRACTOR: FRANK MARSHALL ELECTRIC

NAME: ADAM MARSHALL

TITLE: MANAGING MEMBER

DATE: 3/5/20

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SECTION 00530

CHANGE ORDER

Change Order No. _____

Date: _____

Agreement Date: _____

Name of Project: WATER TREATMENT PLANT VFD REPLACEMENT

OWNER: CITY OF GENEVA

CONTRACTOR: _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

Justification:

Change to the CONTRACT PRICE: $ _____

Original CONTRACT PRICE: $ _____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER: $ _____

The CONTRACT PRICE due to this CHANGE ORDER will be

(Increased) (Decreased) By : $ _____

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

Change to CONTRACT TIME:

The CONTRACT TIME will be (Increased) (Decreased) by _____ Calendar Days.

The Date for Completion of all work will be (Date) _____

Approvals Required: To be effective this Order must be approved by the Federal Agency if it changes the scope or objective of the PROJECT.

Requested by: _____

Recommended by: _____

Ordered by: _____

Accepted by: _____

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Bond #S014160

SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that:

NAME OF CONTRACTOR: Frank Marshall Electric Midwest, LLC

ADDRESS OF CONTRACTOR: 1043 Oliver Avenue, Aurora IL 60506

a Corporation, hereinafter called Principal, and

NAME OF SURETY: Employers Mutual Casualty Company,

ADDRESS OF SURETY: P O Box 712, Des Moines, IA 50306

hereinafter called Surety, are held and firmly bound unto the **CITY OF GENEVA** hereinafter called **OWNER**, in the penal sum of $ 28,700.00----; in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the **OWNER**, dated the 2nd day of March, 2020, a copy of which is hereto attached and made a part thereof for the construction of the **WATER TREATMENT PLANT VFD REPLACEMENT.**

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

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

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

IN WITNESS WHEREOF, this instrument is executed in 5 counterparts, each of which shall be deemed an original, this the 9th day of March, 2020.

Any suit under this bond must be instituted before the expiration of the Statute of Limitations applicable to any claim against the contractor named herein.

Frank Marshall Electric Midwest, LLC **CONTRACTOR**

BY: _____

NAME: ADAM MARSHALL (PRINCIPAL)

TITLE: MANAGING MEMBER

ADDRESS: 1043 Oliver Avenue, Aurora, IL 60506

CONTRACTORS CORPORATE SEAL

ATTEST

BY: _____

NAME: ADAM MARSHALL (PRINCIPAL SECRETARY)

TITLE: MANAGING MEMBER / SECRETARY

ADDRESS: 1043 OLIVER AVENUE AURORA, IL 60506

WITNESS AS TO PRINCIPAL

BY: _____

NAME: BRUCE ANDERSON

TITLE: MEMBER

ADDRESS: 1043 OLIVER AVENUE AURORA, IL 60506

Employers Mutual Casualty Company **SURETY**

BY: _____

NAME: William P. Maher (ATTORNEY IN FACT)

(ATTACH VERIFICATION OF POWER OF ATTORNEY)

ADDRESS: 4811 Emerson Ave., Suite 102
Palatine IL 60067

SURETY CORPORATE SEAL

WITNESS AS TO SURETY

BY: _____

NAME: V Broaddus

ADDRESS: 4811 Emerson Ave., Suite 102
Palatine IL 60067

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

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

EMC INSURANCE

P.O. Box 712 • Des Moines, Iowa 50306-0712

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

KNOW ALL MEN BY THESE PRESENTS, that:

1. Employers Mutual Casualty Company, an Iowa Corporation
2. EMCASCO Insurance Company, an Iowa Corporation
3. Union Insurance Company of Providence, an Iowa Corporation
4. Illinois EMCASCO Insurance Company, an Iowa Corporation
5. Dakota Fire Insurance Company, a North Dakota Corporation
6. EMC Property & Casualty Company, an Iowa Corporation

hereinafter referred to severally as "Company" and collectively as "Companies", each does, by these presents, make, constitute and appoint:

WILLIAM P. MAHER

its true and lawful attorney-in-fact, with full power and authority conferred to sign, seal, and execute the Bid Bond

Any and All Bonds

and to bind each Company thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of each such Company, and all of the acts of said attorney pursuant to the authority hereby given are hereby ratified and confirmed.

AUTHORITY FOR POWER OF ATTORNEY

This Power-of-Attorney is made and executed pursuant to and by the authority of the following resolution of the Boards of Directors of each of the Companies at the first regularly scheduled meeting of each company duly called and held in 1999:

RESOLVED: The President and Chief Executive Officer, any Vice President, the Treasurer and the Secretary of Employers Mutual Casualty Company shall have power and authority to (1) appoint attorneys-in-fact and authorize them to execute on behalf of each Company and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof; and (2) to remove any such attorney-in-fact at any time and revoke the power and authority given to him or her. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power-of-attorney issued to them, to execute and deliver on behalf of the Company, and to attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and any such instrument executed by any such attorney-in-fact shall be fully and in all respects binding upon the Company. Certification as to the validity of any power-of-attorney authorized herein made by an officer of Employers Mutual Casualty Company shall be fully and in all respects binding upon this Company. The facsimile or mechanically reproduced signature of such officer, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power-of-attorney of the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS THEREOF, the Companies have caused these presents to be signed for each by their officers as shown, and the Corporate seals to be hereto affixed this 1st day of July , 2018 .

Seals

ILLINOIS EMCASCO INSURANCE COMPANY CORPORATE SEAL IOWA

UNION INSURANCE COMPANY OF PROVIDENCE INCORPORATED 1863 IOWA

EMC PROPERTY & CASUALTY CO. INCORPORATED 1953 IOWA

EMCASCO INSURANCE COMPANY CORPORATE SEAL IOWA

DAKOTA FIRE INSURANCE COMPANY CORPORATE SEAL NORTH DAKOTA

EMPLOYERS MUTUAL CASUALTY CO. CORPORATE SEAL DES MOINES, IOWA

KATHY LOVERIDGE
Commission Number 780769
My Commission Expires
October 10, 2019

Bruce G. Kelley, CEO, Chairman of Companies 2, 3, 4, 5 & 6; President of Companies 1, 2 & 6; Treasurer of Companies 1, 2, 3, 4 & 6

Todd Strother
Senior Vice President

On this 1st day of July , 2018 before me a Notary Public in and for the State of Iowa, personally appeared Bruce G. Kelley and Todd Strother, who, being by me duly sworn, did say that they are, and are known to me to be the CEO, Chairman, President and Treasurer, and/or Senior Vice President, respectively, of each of the Companies above; that the seals affixed to this instrument are the seals of said corporations; that said instrument was signed and sealed on behalf of each of the Companies by authority of their respective Boards of Directors; and that the said Bruce G. Kelley and Todd Strother, as such officers, acknowledged the execution of said instrument to be their voluntary act and deed, and the voluntary act and deed of each of the Companies.

My Commission Expires October 10, 2019.

Kathy Loveridge
Notary Public in and for the State of Iowa

CERTIFICATE

I, James D. Clough, Vice President of the Companies, do hereby certify that the foregoing resolution of the Boards of Directors by each of the Companies, and this Power of Attorney issued pursuant thereto on 1st day of July , 2018 , are true and correct and are still in full force and effect.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 1st day of March 2020

Vice President

SECTION 00605

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that:

NAME OF CONTRACTOR: Frank Marshall Electric Midwest, LLC

ADDRESS OF CONTRACTOR: 1043 Oliver Avenue
Aurora IL 60506

a Corporation, hereinafter called Principal, and

NAME OF SURETY: Employers Mutual Casualty Company,

ADDRESS OF SURETY: P O Box 712
Des Moines, IA 50306

hereinafter called Surety, are held and firmly bound unto the **CITY OF GENEVA,** hereinafter called **OWNER,** in the penal sum of $ 28,700.00--- in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the **OWNER,** dated the 2nd day of March, 2020, a copy of which is hereto attached and made a part hereof for the construction of the **WATER TREATEMENT PLANT VFD RELACEMENT.**

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

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

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

In witness whereof, this instrument is executed in five (5) counterparts, each of which shall be deemed an original, this the 9th day of March, 2020.

Frank Marshall Electric Midwest, LLC **CONTRACTOR**

BY: [signature]

NAME: ADAM MARSHALL

TITLE: MANAGING MEMBER

ADDRESS: 1043 Oliver Avenue, Aurora, IL 60506

CONTRACTORS CORPORATE SEAL

ATTEST

BY: _____

NAME: ADAM MARSHALL (PRINCIPAL SECRETARY)

TITLE: MANAGING MEMBER / SECRETARY

ADDRESS: 1043 OLIVER AVENUE AURORA, IL 60506

WITNESS AS TO PRINCIPAL

BY: _____

NAME: BRUCE ANDERSON

TITLE: MEMBER

ADDRESS: 1043 OLIVER AVENUE AURORA, IL 60506

Employers Mutual Casualty Company **SURETY**

BY: _____

NAME: William P. Maher (ATTORNEY IN FACT)

(ATTACH VERIFICATION OF POWER OF ATTORNEY)

ADDRESS: 4811 Emerson Ave., Suite 102
Palatine IL 60067

SURETY CORPORATE SEAL

WITNESS AS TO SURETY

BY: _____

NAME: V Broaddus

ADDRESS: 4811 Emerson Ave., Suite 102
Palatine IL 60067

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

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

EMC INSURANCE

P.O. Box 712 • Des Moines, Iowa 50306-0712

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

KNOW ALL MEN BY THESE PRESENTS, that:

1. Employers Mutual Casualty Company, an Iowa Corporation
2. EMCASCO Insurance Company, an Iowa Corporation
3. Union Insurance Company of Providence, an Iowa Corporation
4. Illinois EMCASCO Insurance Company, an Iowa Corporation
5. Dakota Fire Insurance Company, a North Dakota Corporation
6. EMC Property & Casualty Company, an Iowa Corporation

hereinafter referred to severally as "Company" and collectively as "Companies", each does, by these presents, make, constitute and appoint:

WILLIAM P. MAHER

its true and lawful attorney-in-fact, with full power and authority conferred to sign, seal, and execute the Bid Bond

Any and All Bonds

and to bind each Company thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of each such Company, and all of the acts of said attorney pursuant to the authority hereby given are hereby ratified and confirmed.

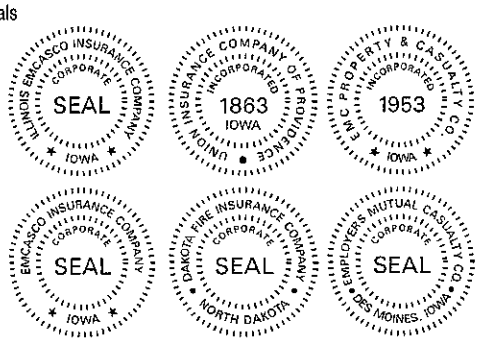
AUTHORITY FOR POWER OF ATTORNEY

This Power-of-Attorney is made and executed pursuant to and by the authority of the following resolution of the Boards of Directors of each of the Companies at the first regularly scheduled meeting of each company duly called and held in 1999:

RESOLVED: The President and Chief Executive Officer, any Vice President, the Treasurer and the Secretary of Employers Mutual Casualty Company shall have power and authority to (1) appoint attorneys-in-fact and authorize them to execute on behalf of each Company and attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof; and (2) to remove any such attorney-in-fact at any time and revoke the power and authority given to him or her. Attorneys-in-fact shall have power and authority, subject to the terms and limitations of the power-of-attorney issued to them, to execute and deliver on behalf of the Company, and to attach the seal of the Company thereto, bonds and undertakings, recognizances, contracts of indemnity and other writings obligatory in the nature thereof, and any such instrument executed by any such attorney-in-fact shall be fully and in all respects binding upon the Company. Certification as to the validity of any power-of-attorney authorized herein made by an officer of Employers Mutual Casualty Company shall be fully and in all respects binding upon this Company. The facsimile or mechanically reproduced signature of such officer, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power-of-attorney of the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN WITNESS THEREOF, the Companies have caused these presents to be signed for each by their officers as shown, and the Corporate seals to be hereto affixed this 1st day of July , 2018 .

Seals



KATHY LOVERIDGE
Commission Number 780769
My Commission Expires
October 10, 2019

Bruce G. Kelley, CEO, Chairman of Companies 2, 3, 4, 5 & 6; President of Companies 1, 2 & 6; Treasurer of Companies 1, 2, 3, 4 & 6

Todd Strother
Senior Vice President

On this 1st day of July , 2018 before me a Notary Public in and for the State of Iowa, personally appeared Bruce G. Kelley and Todd Strother, who, being by me duly sworn, did say that they are, and are known to me to be the CEO, Chairman, President and Treasurer, and/or Senior Vice President, respectively, of each of the Companies above; that the seals affixed to this instrument are the seals of said corporations; that said instrument was signed and sealed on behalf of each of the Companies by authority of their respective Boards of Directors; and that the said Bruce G. Kelley and Todd Strother, as such officers, acknowledged the execution of said instrument to be their voluntary act and deed, and the voluntary act and deed of each of the Companies.

My Commission Expires October 10, 2019.

Kathy Loveridge
Notary Public in and for the State of Iowa

CERTIFICATE

I, James D. Clough, Vice President of the Companies, do hereby certify that the foregoing resolution of the Boards of Directors by each of the Companies, and this Power of Attorney issued pursuant thereto on 1st day of July , 2018 , are true and correct and are still in full force and effect.

In Testimony Whereof I have subscribed my name and affixed the facsimile seal of each Company this 9th day of March 2020.

Vice President

FRANKM1 OP ID: TM

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 03/11/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER 224-612-5376 King-Forman Insurance Agency 2604 E. Dempster St., #501 Park Ridge, IL 60068 Dennis M. Reed	CONTACT NAME: Tina May PHONE (A/C, No, Ext): 224-612-5376 FAX (A/C, No): 224-612-5365 E-MAIL ADDRESS: tmay@kingforman.com
	INSURER(S) AFFORDING COVERAGE — NAIC #
	INSURER A : Secura Insurance Co. — 22543
INSURED Frank Marshall Electric Midwest, LLC 1043 Oliver Avenue Aurora, IL 60506	INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:			CP3123146	03/01/2020	03/01/2021	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 100,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
A	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY / SCHEDULED AUTOS HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY			A3123147	03/01/2020	03/01/2021	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
A	UMBRELLA LIAB [X] OCCUR EXCESS LIAB [ ] CLAIMS-MADE DED [X] RETENTION $ 10,000			CU3123149	03/01/2020	03/01/2021	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N [ ] If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		WC3123148	03/01/2020	03/01/2021	X PER STATUTE / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
A	Rented Equipment			CP31223146	03/01/2020	03/01/2021	Limit	50,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Re: Water Treatment Plant VFD Replacement City of Geneva
City of Geneva and Deuchler Engineering Corp are included as Additional Insured with respect to General Liability

CERTIFICATE HOLDER

CITYGEN

City of Geneva
1800 South Street
Geneva, IL 60134

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

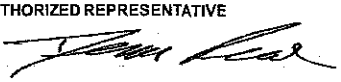


TABLE OF CONTENTS

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the 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. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

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*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR 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 Substantial Completion; and (ii) 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.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21. *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.

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

23. *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.

24. *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.

25. *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.

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

27. *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.

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *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.

30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *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.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *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.

36. *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.

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. *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.

40. *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.

41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *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.

43. *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.

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

45. *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.

46. *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.

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

48. *Work*--The entire completed 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.

49. *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.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

1.02 *Terminology*

A. *Intent of Certain Terms or Adjectives*

1. Whenever in the Contract Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or 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 action or determination will be solely to evaluate, in general, the completed 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 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 9.10 or any other provision of the Contract Documents.

B. *Day*

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

C. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or 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).

D. *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.

E. 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*

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 *Copies of Documents*

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. 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. *CONTRACTOR's Review of Contract Documents:* 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; however, 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. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its 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 Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; 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.

C. *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.

2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by 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.B, procedures for handling Shop

Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. Unless otherwise provided in the Contract Documents, at least ten 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 below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten 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 any specified Milestones and 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 Shop Drawing and Sample 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 called for by one is as binding as if called for 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, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees 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. 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 report it to ENGINEER in writing at once. 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; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy 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:

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 in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) 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: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) 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 any of the Work under a direct or indirect contract with OWNER: (i) shall not 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 Consultant, including electronic media editions; and (ii) shall not 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. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL 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, 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 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, ENGINEER, or any of ENGINEER's Consultants 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

2. 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 9.08 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 in respect of 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 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 within the time and 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, ENGINEER, and ENGINEER's Consultants 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 of 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 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, ENGINEER or any of ENGINEER's Consultants 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); 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, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other 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.E 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, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other 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.F 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 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

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 CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, 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 such 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 within 20 days thereafter substitute 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. 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: (i) by any person as a result of an offense directly or indirectly related to the employ-

ment of such person by CONTRACTOR, or (ii) 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 so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, 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, and other 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 6.07, 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 thirty 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 (and 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, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the

officers, directors, partners, employees, agents, and other 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 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, 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, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, 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 or Written Amendment. 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, ENGINEER, ENGINEER's Consultants, 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, and other 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, and other 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, ENGINEER, ENGINEER's Consultants, 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, and other 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, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other 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 peril 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, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other 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 or Written Amendment.

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 2.05.C. 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 Superintendence6.01*

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, but 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. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto 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, lay out, and construct the Work 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, and CONTRACTOR will not permit overtime work or the performance of Work on 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 General Requirements, 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 warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. 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 (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

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: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, 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 procedure 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 first 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 shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, 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 work on the Project) to adapt the design to the proposed substitute item and 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. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also 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, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and 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 procedure for review by ENGINEER will be similar to that provided in subparagraph 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 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 time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such 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 or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or 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 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 shall it 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, ENGINEER, ENGINEER's Consultants, 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, and other 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. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants 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. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and 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.

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 may 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, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants 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 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, Written Amendments, 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:

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. 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 ENGINEER's Consultant, 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). 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 to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The 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.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, 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.

D. *Submittal Procedures*

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

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

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

d. CONTRACTOR 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 indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

E. *ENGINEER's Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample 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 of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.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 approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

F. *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, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. 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.

B. 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 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 acceptance by OWNER or any failure to do so;

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

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

8. 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, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other 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:

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

2. is caused in whole or in part by any negligent act or omission of 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, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

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 Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them 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.

ARTICLE 7 - OTHER WORK

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let 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 and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and 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. Unless otherwise provided in the Contract Documents, 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.

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 Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

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 9.10, and 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 responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. 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, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *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 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, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or 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.

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

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

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

9.08 *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.

9.09 *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. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, 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. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.10 *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 responsible 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 9.10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Agreement 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 Written Amendment, 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 (or Written Amendments) 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 and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter 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. Notice of the amount or extent of the Claim, dispute, or other matter 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, dispute, or other matter). 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 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).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH 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 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, 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, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, 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, 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 *Cash 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 as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the 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

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the 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.

B. 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 Work1*

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. 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 9.08.

B. 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.

C. 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. if 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 or by a Written Amendment. 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

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 (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) 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 (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) 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.

12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to 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.

12.05 *Delays Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and

CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or

2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

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.

13.02 *Access to Work*

A. OWNER, ENGINEER, ENGINEER's Consultants, 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.B; 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. If it is found that such 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. If, however, such 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 Milestones), 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.

13.06 *Correction or Removal of Defective Work*

A. 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).

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 Laws or Regulations or 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: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) 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. If CONTRACTOR does not promptly comply with

the terms of such 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, and 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.

B. 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 or by Written Amendment.

C. 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.

D. 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 and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and 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 (or Milestones) 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 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 9.08, and to any other qualifications stated in the recommendation); and

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: (i) 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 (ii) 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 to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or 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 referred to 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 Written Amendment or 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. Not Included

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 must 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.

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. Promptly thereafter, 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. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and 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. 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.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Use by OWNER at OWNER's option of 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, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If 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. 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. 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.

2. No 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 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: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) 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. *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 will become due and, when due, 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 and recommendation of ENGINEER, and without terminating the Agreement, 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 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 writing which are 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 allowed 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 the surety, if any) seven days written notice, terminate the services of CONTRACTOR, 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), 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 finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. 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.

C. 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.

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, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for 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. for expenses sustained prior to the effective date of termination in performing services and furnishing 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. for 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. for 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, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or 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. 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. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

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 delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered 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.

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, and 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 Agreement.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

WATER TREATMENT PLANT VFD REPLACEMENT
CITY OF GENEVA

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract (No. 1910-8, 1996 Edition) 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. In the event there is any conflict between the Supplementary Conditions and any provision contained in any other portion of the contract, the provisions of the Supplementary Conditions shall prevail.

SC - 1 Definitions

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

SC - 1.01.A.12 Contract Documents

Amend line 3 of paragraph 1.01.A.12 by inserting the words “Advertisement for Bids, Instructions for Bidders,” between the word “the” and “Agreement”.

SC-2.01A

Add the following sentence to the end of the paragraph.

The Contractor shall also submit a schedule of values prior to the Execution of the Agreement. Each line item in the schedule of values must clearly indicate the supplier/subcontractor responsible for that line item.

SC - 2.02A Copies of Documents

Delete paragraph 2.02 of the General Conditions in its entirety and insert the following in its place: “Owner shall furnish to the Contractor up to three (3) copies of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.”

SC - 2.05.B.2

Delete paragraph 2.05.B.2 of the General Conditions in its entirety.

SC -2.05.B.3

Replace Paragraph 2.05.B.3 with:

A complete and detailed schedule of values is to be submitted prior to the Execution of the Agreement.

SC - 2.05.C

Delete paragraph 2.05.C of the General Conditions in its entirety and insert the following in its place: Before any work at the site is started, **Contractor** shall deliver to **Owner**, with a copy to **Engineer**, certificates (and other evidence of insurance requested by **Owner**) which **Contractor** is required to purchase and maintain in accordance with Article 5 of the General Conditions and as modified under these Supplementary Conditions.

SC - 2.06 Preconstruction Conference

Delete paragraph 2.06 in its entirety and insert the following in its place: "Within ten (10) days after the effective date of the Agreement, but before **Contractor** starts work at the site, a conference attended by **Contractor**, **Engineer**, **Owner** and others as appropriate will be held to discuss the schedules referred to in paragraph 2.05.B of the General Conditions and for processing applications for payment and to establish a working understanding among the parties as to the work."

SC - 2.07.A.2 Initial Acceptance of Schedules

Delete paragraph 2.07.A.2 in its entirety.

SC - 4.06.G

Delete reference to "paragraph 4.06.E" and substitute "paragraph 4.06.G".

SC - 5.03 TO SC - 5.09

Delete paragraphs 5.03 through 5.09, inclusive, in their entirety and insert the following in their place:

5.3 Indemnification and Insurance

A. Indemnification

To the fullest extent permitted by law, the **Contractor** shall indemnify, hold harmless and defend the **Owner**, the **Engineer**, and their agents, officers 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 performance of the services required under this Agreement; provided, however, that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the **Contractor**, anyone directly or indirectly employed by him or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right of obligation or indemnity which would otherwise exist as to any party or person described in this paragraph 5.3.1.

B. Insurance

During the life of the contract, the **Contractor** shall effect and maintain, with companies satisfactory to the **Owner**, the types of insurance, and in the amounts, described herein.

All insurance shall be from insurance companies duly authorized to do business in the State of Illinois, and shall be issued or countersigned by duly authorized representatives of such insurance companies in the State of Illinois. This insurance shall be provided within ten days of the written Notice of Award of the Contract, and no work shall commence unless the insurance is in effect and has been approved by the **Contractor**. The **Contractor** shall not allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and approved.

The types of insurance and limits of coverage to be maintained are as follows:

1. Builders Risk Insurance shall not be required for this project.

2. Comprehensive General Liability Insurance covering claims for damages for bodily injury, including accidental death, as well as from claims for property damage which may arise from operations under the Contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them, including coverages for explosion, collapse of other structures and underground utilities. Coverage shall be not less than $5,000,000.00 for injuries, including wrongful death, to any one person, and subject to the same limit for each person on account of one accident, in a total amount of not less than $5,000,000.00. Property damage coverage shall be in an amount not less than $5,000,000.00. The insurance shall contain an endorsement covering the Contract for X, C, and U.

   The **Contractor** agrees to name the City of Geneva, Illinois and Deuchler Engineering Corporation as additional insureds within the **Contractor's** comprehensive general liability policy and require this coverage to be subject to the standard conditions and exclusions for the endorsement adding **Engineers** as additional insured to standard comprehensive general liability policies; or the **Contractor** shall have the option to provide an Owner's Protective Liability Policy naming Deuchler Engineering Corporation as an additional insured for the limits shown above. All such coverage shall be primary and non-contributory.

3. The **Contractor** shall require each of his subcontractors to procure and maintain during the life of his subcontract, subcontractor's Comprehensive General Liability Insurance of the type specified in Paragraph B hereof in the amounts equal to that required by the **Contractor**.

4. Workmen's Compensation and Employer's Liability Insurance for all his employees engaged in the work under this Contract, in accordance with the laws of the State of Illinois. The **Contractor** shall require each of his

subcontractors to provide Workmen's Compensation (Statutory) and Employer's Liability ($1,000,000.00) for all of the latter's employees engaged on such subcontracts. If any class of employees engaged on work under the Contract is not protected under the Workmen's Compensation statute, the **Contractor** shall provide similar protection for these employees in amounts not less than the legal requirements. A certificate of insurance shall be provided to the **Owner**.

5. Comprehensive General Automobile Liability Insurance, including employees non-ownership liability and hired automobile insurance. Coverage shall be $500,000.00/$1,000,000.00 for Bodily Injury and $500,000.00 for Property Damage as minimum requirements.

All of the aforesaid insurance policies must be issued as required by law and must be endorsed to provide that the insurance company shall give 30 days written notice to the **Owner** if the policies are to be terminated or if any changes are made during the policy term in any way. Before commencing work the **Contractor** shall furnish to the **Owner** a copy of each policy or policies and certificates in a form acceptable to the **Owner**, evidencing such insurance which he and each of his subcontractors shall carry in accordance herewith together with receipted bills evidencing proof of premium payment.

SC-6.06.A Concerning Subcontractor, Suppliers, and Others

Supplement paragraph 6.06.A by adding the following:

The Contractor shall submit the identity of all subcontractors, suppliers and other persons and organizations (including those who are to furnish the principal items of the material and equipment) in the Schedule of Values per SC 2.01.A.

Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each Subcontractor, Supplier, person or organization.

SC-6.06.C Concerning Subcontractor, Suppliers, and Others

Supplement paragraph 6.06.C by adding the following:

Owner or **Engineer** may furnish to any such Subcontractor, Supplier or other person or organization, to the extent practicable, evidence of amounts paid to **Contractor** in accordance with **Contractor's** Applications for Payment. **Owner** reserves the right to directly pay subcontractors, suppliers, or other persons or organizations identified in **Contractor's** sworn statement.

SC-6.07 Patent Fees and Royalties

None required.

SC-6.08 Permits

None required.

SC-6.10 Taxes

Sales taxes will not have to be paid on equipment and material purchased for this project.

SC-6.12 Record Documents

Supplement paragraph 6.12 by adding the following:

No progress payments shall be made to Contractor if record documents have not been annotated to show changes made during construction to the ending date of the progress payment period. Contractor shall make record documents available for inspection by the Engineer or Project Representative upon request.

SC-6.13 Safety and Protection

Supplement paragraph 6.13 by adding the following:

Any fines imposed upon the **Owner**, the **Engineer**, or the **Owner's** Agents as a result of the **Contractor's** failure to comply with any safety regulations shall be paid by the **Contractor**.

SC-9.03 Project Representative

Supplement paragraph 9.03 by adding the following:

The duties, responsibilities, and limitations of the Resident Project Representative (RPR) are described as follows:

1. *General:* 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 **Contractor's** work in progress 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**.

2. *Schedules:* Review the progress schedule, schedule of Shop Drawings and Sample submittals, and schedule of values prepared by **Contractor** and consult with **Engineer** concerning acceptability.

3. *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.

4. *Liaison*:

    a. Serve as **Engineer's** liaison with **Contractor**, working principally through **Contractor's** superintendent and assist in understanding the intent of the 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.

5. *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 **Engineer**.

6. *Shop Drawings and Samples:*

a. Record date of receipt of Samples and approved Shop Drawings.

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 RPR believes that the submittal has not been approved by **Engineer**.

7. *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**.

8. *Review of Work and Rejection of Defective work:*

a. Conduct on-site observations of **Contractor's** 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 require special testing, inspection or approval.

9. *Inspections, Tests, and System Startups:*

a. Consult with **Engineer** in advance of scheduled major inspections, tests, and systems startups 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 startups.

d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections, and report to **Engineer**.

10. *Records:*

a. Maintain at the site orderly files for correspondence, reports of job conferences, reproductions of original Contract Documents including all work 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 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**.

11. *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 system startup reports.

d. Report immediately to **Engineer** that occurrence of any site accidents, any Hazardous Environmental Conditions, emergencies, or acts of God endangering the work, and property damaged by fire or other causes.

12. *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.

13. *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.

14. *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.

15. *Resident Project Representative shall **not**:*

    a. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including “or-equal” items).

    b. Exceed limitations of **Engineer’s** authority as set forth in the agreement or the Contract Documents.

    c. Undertake any of the responsibilities of **Contractor**, subcontractors, suppliers, or **Contractor’s** superintendent.

    d. Advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences or procedures of **Contractor’s** work unless such advice or directions are specifically required by the Contract Documents.

    e. Advise on, issue directions regarding, or assume control over safety precautions and programs in connection with the activities or operations of **Owner** or **Contractor**.

    f. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by **Engineer**.

g. Accept Shop Drawing or Sample submittals from anyone other than **Contractor**.

h. Authorize **Owner** to occupy the Project in whole or in part.

SC-14.02.A.2 Applications for Payments

Add the following sentences to Paragraph 14.02.A.2:

The application for payment shall be accompanied by a sworn Contractor's Statement identifying all Subcontractors and Suppliers, the amount of labor and material each has completed, the amount paid, the amount owed and the balance of work remaining. **Owner** reserves the right to directly pay Subcontractors and Suppliers the amount owed for labor and material completed.

Each application for payment must be accompanied by a construction schedule showing all project tasks and durations. If a complete schedule is not submitted with the application for payment, the application for payment will not be processed.

SC-14.02.A.3 Applications for Payments

Delete 14.02.A.3 in its entirety and substitute the following:

The amount of retainage with respect to progress payments will be as stipulated in Specification Section 01 29 76 – Progress Payment Procedures.

SC-16 Dispute Resolution

Delete Article 16 in its entirety.

END OF SECTION

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DIVISION 01

GENERAL REQUIREMENTS

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SECTION 01 14 00

WORK RESTRICTIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Description of project / site conditions.
   2. Description of Required Sequence of construction.

B. Related Requirements:
   1. Section 01 31 13 - Project Coordination.

1.02 PROJECT/SITE CONDITIONS

A. Environmental Requirements
   1. The Contractor shall exercise all the necessary precautions so as not to interfere with the operation of the facility. The Contractor shall obtain approval of the Owner as to his detailed plans and schedules for accomplishing and prosecuting the work prior to starting any operations related to connections to existing facilities. Schedules and plans shall be revised or modified as directed by the Owner. Schedules and plans shall be complete to indicate that the Contractor will be properly mobilized and prepared, in the opinion of the Owner, to carry out any and all operations.
   2. All costs, work and requirements including, but not limited to, scheduling, temporary services and construction, coordination and cooperation, rescheduling, maintaining temporary services and construction, field measurements and restoration for accomplishing work to conform to the "Sequence of Construction" and other provisions for connecting to existing facilities shall be included in the lump sum contract price and no separate or additional payment will be made therefore.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION

3.01 LIMITATIONS ON SEQUENCE OF CONSTRUCTION

A. Scheduling of all work shall be organized with the intent of keeping existing facilities in operation and minimizing the impact to the use of existing roadways, utilities, and facilities. Plant processes may not be shutdown.

B. Only the Owner may operate existing valves, gates, process equipment, etc. Scheduling of work requested of the Owner must take place 48 hours in advance. Without penalty/change order, the Owner at his discretion may choose to deviate from the agreed scheduled shut-down/operation due to over-riding treatment

plant operations/maintenance requirements related to maintaining compliance with the plant's NPDES permit.

C. Where junction boxes are to be located over existing piping, exploratory excavations are to take place and the dimensions of proposed junction boxes refined if necessary, to meet existing conditions.

D. Work on this Contract may occur simultaneously with other work at the Owner's facilities. Coordinate use of roadways and site with the Owner and other Contractors.

E. Work on the Operations and Maintenance Building will be occurring simultaneously.

F. Only one clarifier and associated vault may be taken out of service at a time.

3.02 GENERAL DESCRIPTION OF WORK

A. Removal of two existing variable frequency drives (VFDs) and installation of two new VFDs (already purchased and located on site).

B. New wiring, conduit, and associated civil and electrical work for a complete and operational system.

3.03 SUGGESTED SEQUENCE OF CONSTRUCTION

A. A sequence of construction is suggested below for consideration by the Contractor. The Contractor is ultimately responsible for the sequence of construction, including but not limited to scheduling, organization, and coordination of the work to be performed considering the current operational and maintenance constraints of the treatment facility. The Contractor is responsible for providing detailed updated schedules at the construction meetings per Section 01 31 19 – Project Meetings. Coordination of the sequence of construction shall be a standing item at the meetings and any deviations from the suggested sequence of construction presented below may be discussed during the construction meetings per specification Section 01 31 19.

B. Preliminary Activities including but not limited to: Extension of concrete equipment pad.

C. Sequence of construction: Only one VFD may be down at a time. Three pumps must be available at all times. Contractor shall remove one VFD, install new VFD and test, commission, start-up and put into service that new VFD before taking the other VFD out of service.

END OF SECTION

SECTION 01 26 57

CHANGE ORDER PROCEDURES

PART 1 - GENERAL

1.01 Summary

A. Section Includes:
1. Procedures for processing Change Orders.

B. Related Requirements:
1. Section 00400 - Agreement.
2. Section 00530 - Change Order Form.
3. Section 00 72 00 - General Conditions: Governing requirements for changes in the Work, in Contract cost, and Contract time.
4. Section 01 30 00 - Administrative Requirements: Applications for Payment.
5. Section 01 33 00 - Submittal Procedures.
6. Section 01 60 00 - Product Requirements.
7. Section 01 77 00 - Closeout Requirements.

1.02 SUBMITTALS

A. Submit name of the individual authorized to accept changes, and to be responsible for informing others in Contractor's employ of changes in the Work.
1. As specified in Section 01 30 00 - Administrative Requirements, the use of Google Docs, or similar, will be directed by the Owner. Specifically, all transmittals may be required to be posted into the Google Docs system. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.

B. Change Order Forms: See Section 00530 - Change Order Form.

1.03 PRELIMINARY PROCEDURES

A. Engineer may submit a Proposal Request which includes: Detailed description of change with supplementary or revised Drawings and Specifications.
1. As specified in Section 01 30 00 - Administrative Requirements, the use of Google Docs, or similar, will be directed by the Owner. Specifically, all RFI’s and RFP’s may be required to be posted into the Google Docs system. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.

B. Contractor may initiate a change by submittal of a request to Engineer describing the proposed change with a statement of the reason for the change, the effect on Contract Sum and Contract Time with full documentation. Document any

requested substitutions in accordance with Section 01 60 00 - Product Requirements.

1. As specified in Section 01 30 00 - Administrative Requirements, the use of Google Docs, or similar, will be directed by the Owner. Specifically, all RFI's and RFP's may be required to be posted into the Google Docs system. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.

C. Under no circumstances, may the contractor perform work deemed by the contractor to be a "Change Order" without prior authorization from the Owner's Representative/Engineer. If work is performed without authorization, the contractor will be considered to be working 'at-risk', and the Owner may deny payment without penalty.

1.04 CHANGE ORDERS

A. Will be based on Proposal Request and Contractor's quotation, or Contractor's request for Change Order as approved by Engineer.

1.05 EXECUTION OF CHANGE ORDERS

A. Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

B. To be effective, all Change Orders for this project must be approved by the Federal agency if it changes the scope or objective of the project.

1.06 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum as shown on Change Order.

B. Promptly revise Progress Schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

C. Promptly enter changes in Project Record Documents.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Unless a specific item is set forth for payment in the Contractor's Bid, all work shall be considered incidental to the lump sum prices as set forth by the Contractor in his bid.

1.02 LEAKAGE TESTS

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: Separate payment will not be made.

1.03 MANHOLES

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: Separate payment will not be made.

1.04 CATCH BASINS, INLETS AND VALVE VAULTS

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: Separate payment will not be made.

1.05 EXCAVATION AND BACKFILL FOR UNDERGROUND CONDUITS

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: Separate payment will not be made.

1.06 DISINFECTION OF WATER DISTRIBUTION SYSTEM

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: Separate payment will not be made.

1.07 DEWATERING

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: Separate payment will not be made.

1.08 ASPHALTIC CONCRETE PAVING

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: No separate measurement will be made.

1.09 CONCRETE

A. MEASUREMENT: No separate measurement will be made.

B. PAYMENT: Separate payment will not be made.

1.10 MOBILIZATION

A. A maximum of 0.10% of the Contract price will be paid for mobilization.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 29 76

PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Description of progress payment amounts.

1.02 FORMAT and SUBMITTAL REQUIREMENTS

A. Progress payments shall be submitted in accordance with Article 14 of the General Conditions and paragraphs SC-6.12, SC-14.02.A.2 and SC-14.02.A.3 of the Supplementary Conditions.

B. The format for the progress payments shall be the same as the Schedule of Values, herein; and provide on AIA forms G702/G703. See sample at end of section.

C. Each application for payment must be accompanied by a construction schedule showing all project tasks and durations.
1. If a complete schedule is not submitted with the application for payment, the application for payment will not be processed.

D. Submit two copies and all partial waivers/final waivers to the Engineer.

E. Applications for Payment will be processed by the Engineer as provided in the General Conditions.

1.03 SUBMITTAL SCHEDULE

A. Submit payment request by the first Monday of each month.

1.04 PROGRESS PAYMENT AMOUNTS

A. All progress payments will be on the basis of the progress of the Work measured by the Schedule of Values established in Article 2 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.

B. Progress payments shall be made in an amount equal to the percentage indicated below, but in each case, less the aggregate of payment previously made and less such amounts as the Engineer shall determine or Owner may withhold, in accordance with paragraph 14.02B of the General Conditions.
1. The amount of each progress payment shall be limited to:
a. One Hundred percent (100%) of the value of the Work completed less the specified retainage (10%).

b. The invoiced value of the major equipment items that have been delivered to the site and are stored in accordance with the Contract requirements less the specified retainage (10%).

c. The invoiced value of a shipment of individual items, such as rebar, pipe, conduit, wire, valves, etc. that exceeds $5,000 in cost less the specified retainage (10%). A shipment will not be paid for until the items are delivered, suitably stored and accompanied by documentation satisfactory to the Owner as provided in paragraph 14.02 of the General Conditions or installed.

2. Payment of the sum of a), b), and c) defined above shall continue until Substantial Completion.

C. Upon Substantial Completion, in an amount sufficient to increase total payments to Contractor to 95% of the Contract Price, less such amounts as Engineer shall determine, or Owner may withhold, in accordance with paragraph 14.02B of the General Conditions.

D. Final Payment. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said paragraph 14.07.

E. Payment in full or in part may be withheld for reasons which include but are not limited to: (1) the existence of defective work which is not remedied; (2) the existence of third party claims filed or reasonable evidence indicating probable filing of such claims; (3) the failure of the Contractor to make payments properly to subcontractors or for labor, materials or equipment; (4) the existence of reasonable evidence that the Work cannot be completed for the unpaid balance of the contract sum; (5) damage to the Owner; (6) the existence of reasonable evidence that the Work will not be completed within the Contract time, and that the unpaid balance will not be adequate to cover actual or liquidated damages for the anticipated delay; or, (7) persistent failure to carry out the work in accordance with the Contract Documents.

F. Owner reserves the right to directly pay Subcontractors and Suppliers the amount owed for labor and material completed and delivered. These payments to the Subcontractors and Suppliers shall be deducted from the current Contract amount.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SAMPLE FORM

AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:	PROJECT:	APPLICATION NO:	Distribution to:
		PERIOD TO:	OWNER ☐
		CONTRACT FOR:	ARCHITECT ☐
FROM CONTRACTOR:	VIA ARCHITECT:	CONTRACT DATE:	CONTRACTOR ☐
		PROJECT NOS: / /	FIELD ☐
			OTHER ☐

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM ..... $ _____
2. Net change by Change Orders ..... $ _____
3. CONTRACT SUM TO DATE (Line 1 ± 2) ..... $ _____
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) ..... $ _____
5. RETAINAGE:
   a. ____ % of Completed Work (Column D + E on G703) $ _____
   b. ____ % of Stored Material (Column F on G703) $ _____
   Total Retainage (Lines 5a + 5b or Total in Column I of G703)..... $ _____
6. TOTAL EARNED LESS RETAINAGE ..... $ _____
   (Line 4 Less Line 5 Total)
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT ..... $ _____
   (Line 6 from prior Certificate)
8. CURRENT PAYMENT DUE ..... $ _____
9. BALANCE TO FINISH, INCLUDING RETAINAGE $ _____
   (Line 3 less Line 6)

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$	$
Total approved this Month	$	$
TOTALS	$	$
NET CHANGES by Change Order	$	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... $ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract

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SAMPLE FORM

CONTINUATION SHEET

AIA DOCUMENT G703 (Instructions on reverse side)

PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATE FOR PAYMENT, containing Contractor's signed Certification, is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO.:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO.:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C – G)	RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					

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G703-1992

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SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Title of Work and Type of Contract.
2. Contractor Use of Premises.
3. Owner Occupancy.
4. Applications for Payment.
5. Coordination.
6. Field Engineering.
7. Reference Standards.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work included in this Contract includes:
1. Removal of two existing variable frequency drives (VFDs) and installation of two new VFDs (already purchased and located on site).
2. New wiring, conduit, and associated civil and electrical work for a complete and operational system.

1.03 CONTRACT METHOD

A. Construct the work under a lump sum price or unit price per item as shown on the Contractor's Bid Form.

1.04 CONTRACTOR USE OF PREMISES

A. The site is located at 4000 Keslinger Road, Geneva, IL 60134.
1. Normal working hours are Monday through Friday: 7 a.m. to 4:00 p.m.
2. Work before and after the specified working hours, and weekends and holidays work may be granted by the Owner if requested in writing at least 48 hours before.
3. If the Owner grants permission to working beyond normal working hours, the contractor will be working at his own costs and no Holiday or overtime pay will be granted to the contractor.
4. At the Owner's discretion, if the permission is granted to work beyond the normal working hours, the Owner may request that an Owner's Representative/Engineer be on site for the duration of the work performed. The contractor will therefore be required to absorb the costs for the Owner's Representative/Engineer at a rate of $110/hour. The costs will accrue and be shown as a credit on the subsequent contractor progress payment application.
5. **Under no circumstances will underground utility, electric, or excavation work be allowed beyond the specified working hours.**

B. Passenger car and small truck access to the existing plant site is controlled by a remotely operated electrified gate. TV cameras at the gate provide visual confirmation of those entering. Contractor is to provide a weekly list of all subcontractors on site and a contact name and number for each.

C. All dirt hauling shall be accomplished on-site using the existing roadway to the sludge drying beds and the haul road from there to the proposed South Plant site for dirt wasting.

D. Location of equipment and materials storage shall be coordinated with the Owner and Owner's Representative. Sufficient space may not be available on site.

E. Coordinate use of premises with the Owner.

F. Contractor may park construction trailers and vehicles only in areas designated on the Contract plans.

G. Construction activities must in no way impede the daily operation of the wastewater plant.

H. The Owner will not accept deliveries. Provide sufficient signs through site to direct delivery trucks to Contractor.

1.05 OWNER OCCUPANCY

A. Owner will continually occupy the site and use the existing buildings, structures, and tanks where work is being performed under this project.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operation while completing the Contract.

1.06 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application under procedures of Section 01 29 76 - Progress Payment Procedures.

B. Content and Format: That specified for Schedule of Values in Section 01 33 00 – Submittal Procedures, Section 00 72 00 General Conditions - Article 14 - Payments to Contractor and Completion of the Standard General Conditions of the Construction Contract, and in Section 00 73 00 - Supplementary Conditions - paragraphs SC 6.12, SC 14.02.A.2, SC-14.02.A.3, SC-14.02C, and SC-14.07.C.

1.07 COORDINATION

A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent

responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. Execute cutting and patching to integrate elements of work, uncover ill timed, defective, and non-conforming work, provide openings for penetrations of existing surfaces, and provide samples for testing. Seal penetrations through slabs, walls, and walkways.

E. The Owner may elect to and require all Contractors and Sub-Contractors to utilize Google Docs, Google Apps, or similar software in addition to standard email, postal mail, and telephone communications.
1. The use of Google Docs, or similar, will be directed by the Owner and may include, but not be limited to; transmittals, memorandums, meeting minutes, Requests For Information (RFI), Requests For Proposals (RFP), punch lists, and shop drawing logs. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.
2. Further information, Terms of Conditions, Privacy, Policies, etc. regarding Google Docs can be found at: http://www.google.com/google-d-s/terms.html
3. Each party will be responsible for keeping their own records and archives of documents posted to Google Docs, or similar. All documents will have the ability to be downloaded and printed by each party.

F. Electronic submittals will not be accepted for shop drawings submittals. All shop drawings will be submitted per the requirements of Section 01 30 00.

1.08 CONSTRUCTION LAY-OUT

A. Provide field engineering services; establish grades, lines and levels, by use of recognized engineering survey practices.

B. Employ a Land Surveyor registered in the State of Illinois.

C. Owner will provide bench marks at locations close to the work to establish vertical control for the Contractor. These benchmarks will also have coordinates for use in horizontal control. These benchmarks will be available at the beginning of the project. The Contractor is required to protect and reestablish benchmarks as necessary.

D. Protect bench marks and other survey reference points.

1.09 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the Bid date or date of Owner Contractor Agreement when there are no bids, except when a specific date is specified.

C. Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work.

1.10 PROJECT SCHEDULE

A. Contractor is to create a Baseline Schedule and submit it in accordance with Article 2 of the General Conditions.

B. The baseline schedule may not be modified to add or delete tasks.

C. The baseline schedule showing progress of each task is to be presented monthly at each progress meeting and with the “pencil” copy of the Application for Payment.

D. Days claimed as “abnormal” weather condition per Article 12.03 of the General Conditions shall be entered as “milestone” task at the end of the schedule with the date and event clearly defined.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 31 13

PROJECT COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Coordination of work of contract.

B. Related Requirements:
1. Section 01 14 00 - Work Restrictions
2. Section 01 30 00 - Administrative Requirements
3. Section 01 73 29 - Cutting and Patching
4. Section 01 31 19 - Project Meetings
5. Section 01 60 00 - Product Requirements: Product options and substitutions.
6. Section 01 77 00 - Execution and Closeout Procedures.

1.02 DESCRIPTION

A. Coordinate scheduling, submittals and work of the various sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.

B. Coordinate sequence of work to accommodate Owner occupancy as specified in Section 01 30 00 - Administrative Requirements.
1. As specified in Section 01 30 00 - Administrative Requirements, the use of Google Docs, or similar, will be directed by the Owner and may include, but not be limited to; transmittals, memorandums, meeting minutes, Requests For Information (RFI), Requests For Proposals (RFP), punch lists, and shop drawing logs. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.

1.03 MEETINGS

A. In addition to progress meetings specified in Section 01 31 19 - Project Meetings, hold coordination meetings and pre-installation conferences with personnel and subcontractors to assure coordination of work.

B. The contractor will be responsible for taking minutes of all progress meetings, coordination meetings and pre-installation conferences and of any other meetings necessary to properly coordinate and execute the work.

1.04 COORDINATION OF SUBMITTALS

A. Schedule and coordinate submittals specified in Section 01 30 00 - Administrative Requirements.

B. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other sections.

1. As specified in Section 01 30 00 - Administrative Requirements, the use of Google Docs, or similar, will be directed by the Owner. Specifically, all transmittals may be required to be posted into the Google Docs system. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.

1.05 COORDINATION OF SPACE

A. Coordinate use of Project space and sequence of installation of mechanical and electrical work. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and repairs.

B. Work on this Contract may occur simultaneously with other work at the Owner’s facilities. Coordinate use of roadways and site with the Owner and other Contractors. Refer to Section 01 14 00 - Work Restrictions

1.06 COORDINATION OF CONTRACT CLOSEOUT

A. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion.

B. After Owner occupancy of premises, coordinate access to site by various sections for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of owner's activities.

C. Assemble and coordinate closeout submittals specified in Section 01 77 00 – Execution and Closeout Procedures.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Contractor participation in preconstruction conferences.
2. Contractor administration of progress meetings.

B. Related Requirements:
1. Section 01 30 00 - Administrative Requirements: Coordination of Work.
2. Section 01 33 00 - Submittal Procedures: Shop drawings, product data, and samples.
3. Section 01 45 00 - Quality Control.
4. Section 01 77 00 - Execution and Closeout Procedures; Project record documents.
5. Individual Specifications Sections; Pre-installation conferences.

1.02 PRECONSTRUCTION CONFERENCES

A. Engineer will administer preconstruction conference for execution of Owner Contractor Agreement and exchange of preliminary submittals.

B. Engineer will administer site mobilization conference at Project site for clarification of Contractor responsibilities in use of site and for review of administrative procedures.

1.03 PROGRESS MEETINGS

A. Schedule and administer weekly Project meetings throughout the progress of the work and pre-installation conferences, when appropriate.

B. Contractor is to make physical arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to Engineer, participants, and those affected by decisions made at meetings.
1. As specified in Section 01 30 00 - Administrative Requirements, the use of Google Docs, or similar, will be directed by the Owner. Specifically, all meeting minutes may be required to be posted into the Google Docs system. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.

C. Attendance: Job superintendent, major subcontractors and suppliers, Owner, and Engineer as appropriate to agenda topics for each meeting.

D. Suggested Agenda: Review of Work progress, status of progress schedule per Specification 01 30 00 and adjustments thereto, delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Requirement Included:
1. Procedures
2. Construction Progress Schedules
3. Schedules of Values
4. Shop Drawings
5. Product Data
6. Samples
7. Manufacturer's Instructions
8. Welding Certificates.

B. Related Requirements:
1. Section 01 30 00 – Administrative Requirements.
2. Section 01 45 00 – Quality Control.
3. Section 01 60 00 – Product Requirements.
4. Section 01 77 00 – Execution and Closeout Procedures.

1.02 PROCEDURES

A. Deliver a minimum of seven (5) copies of a submittal to the Engineer at 230 S. Woodlawn Avenue, Aurora, IL 60506-5109. One copy to be retained by Resident, one copy to be held for Owner, three copies to be retained by Engineer, and two copies will be returned to the Contractor. Contractor is to submit additional quantities as required.

B. Submittals to the Engineer shall identify Project, Contractor, subcontractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification Section number, as appropriate. The submittal shall identify deviations from Contract Documents.

C. The format of the submittal form to be furnished by the Contractor is shown by example at the end of this Section. The Contractor is to pay for printing of form. Submittal Forms shall be 6 sheets of non-carbon paper.

D. Number submittals consecutively.

E. As specified in Section 01 30 00 – Administrative Requirements, the use of Google Docs, or similar, will be directed by the Owner. Specifically, all transmittals may be required to be posted into the Google Docs system. The Contractor and all Sub-Contractors will be required to have a Google Docs login (an email address). Access to this system will be coordinated by the Owner.
1. Note that electronic submittals will not be accepted. All shop drawings submitted to the Engineer will be paper copies as outlined herein.

F. All drawings submitted to the engineering shall be scale drawings printed on full sized sheets with all elements of the drawings being legible. Reduced sized drawings will not be accepted. Drawings with illegible elements will be rejected.

1.03 CONSTRUCTION PROGRESS SCHEDULE

A. Submit per Article 2 of the General Conditions.

B. See Specification Section 01 30 00 for requirements.

1.04 SCHEDULE OF VALUES

A. Submit typed schedule on Contractor's standard form, “Sworn Statement for Contractor and Subcontractor to Owner”, as published by Frank R. Walker Co. or media driven printout will be considered on request.

B. Include in each line item a directly proportional amount of Contractor's overhead and profit.

C. Revise schedule to list change orders for each application for payment. No other revisions are permitted.

D. Submit updated form with each Progress Payment.

E. Submit schedule of values per Article 2 of the General Conditions.

1.05 SHOP DRAWINGS

A. Submit schedule of shop drawings per Article 2 of the General Conditions.

B. Submit number as indicated above.

C. Drawings or descriptive data will be stamped “Requires Review and Approval by Contractor”, “No Exceptions Taken”, “Make Corrections as Noted”, “Revise and Resubmit”, “Rejected” or “Information”, and the drawings and transmittal letter marked accordingly. One copy of the drawings or descriptive data will be returned to the Contractor, one shall go to the Engineer's field representative, and one copy will stay at the Engineer's home office.

D. Additional marked up copies of the drawings or descriptive data required by the Contractor will be prepared by the Contractor.

E. If a drawing or other data is stamped “Make Corrections Noted”, the Contractor shall make the corrections indicated to the material, equipment, etc. for which the shop drawing was submitted. Resubmittal of the shop drawing is not required. The corrections made, however, shall be indicated in the operations and maintenance manual.

F. If a drawing or data is stamped “Revise and Resubmit”, the Contractor shall make the necessary corrections and resubmit the documents.

G. If a drawing or data is stamped “Rejected”, the Contractor shall proceed with new re-submittals.

H. The Contractor shall revise and resubmit the working drawings as required by the Engineer, until they are stamped “No Exceptions Taken”.

I. The Contractor shall have no claim for damages or extension of time on account of any delay in the work resulting from the rejection of material or from revision and re-submittal of drawings and other data for review.

J. The Engineer shall only review a shop drawing a maximum of two times at no cost to the Contractor. The second submittal should be sufficiently complete to be marked “NO EXCEPTIONS TAKEN”. If more than two submittals are required to reach the “NO EXCEPTIONS TAKEN” stage, the cost of review of the submittals will be paid by the Contractor at a rate of $140.00 per hour.

K. If a drawing or data is stamped “Information”, the shop drawing was required by the specifications solely for information for the Owner’s file.

L. If a drawing or data has clearly not been coordinated or reviewed by the General Contractor for completeness, it will be stamped “Requires Review and Approval by Contractor”. The Contractor shall resubmit the documents after properly reviewing them and coordinating with the contract drawings and specifications.

1.06 MANUFACTURER'S INSTRUCTIONS

A. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation and start up, adjusting and finishing, in quantities specified.

1.07 SAMPLES

A. Submit full range of manufacturers' standard colors, textures, and patterns for Owner's selection. Submit samples for selection of finishes within 45 days after date of Contract.

B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.

C. Include identification on each sample, giving full information.

1.08 WELDING CERTIFICATES

A. All welders shall have current certificates conforming to requirements of Section IX, Part A of the ASME Boiler and Pressure Code. Welding of specimens to be witnessed by certifying authority. Submit certificates to Engineer prior to proceeding with structural steel or pipe welding.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SUBMITTAL RECORD

CITY OF GENEVA

WATER TREATMENT PLANT VFD REPLACEMENT

190-19090-00

Sub No.				Prev. Sub. No.				Spec. Section					
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Contractor

Engineer

Deuchler Engineering Corporation

Consulting Engineers

230 Woodlawn Avenue; Aurora, Il 60506

p: 630-897-4651

f: 630-897-5696

ACTION TAKEN				
NO EXCEPTIONS TAKEN	MAKE CORRECTIONS NOTED	REVISE AND RESUBMIT	REJECT	INFORMATION

ROUTING	DATE SENT	DATE RECEIVED	QUANTITY		
			Print	Data	Sample
GC to DEC					
DEC to Sub					
Sub to DEC					
DEC to GC					

DWG NO.	DATED	SUPPLIER	DESCRIPTION

Reviewed as to general conformance with the design concept of the project and general compliance with the contract documents. Contractor is responsible for dimensions which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work of trades; and performing his work in a safe and satisfactory manner

Deuchler Engineering Corporation

Distribution

DEC	- White		Owner	- Pink	
SubConsultant	- Canary		GC	- Green	
RE	- Blue				

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SECTION 01 42 19

REFERENCE STANDARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Applicability of Reference Standards.
2. Provision of Reference Standards at site.
3. Acronyms used in Contract Documents for Reference Standards. Source of Reference Standards.

B. Related Requirements:
1. Section 00 72 00 - General Conditions: Reference Standards.

1.02 QUALITY ASSURANCE

A. For products of workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except where more rigid requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the Bid date, or date of Owner Contractor Agreement when there are no bids, except when a specific date is specified.

C. When required by individual Specifications section, obtain copy of standard. Maintain copy at job site during submittals, planning, and progress of the specific work, until Substantial Completion.

1.03 SCHEDULE OF REFERENCES

A. AABC
Associated Air Balance Council
1000 Vermont Avenue, N.W.
Washington, DC 20005

B. AASHTO
American Association of State Highway and Transportation Officials
444 N. Capitol St., N.W.
Washington, DC 2001

C. ACI
American Concrete Institute
Box 19150
Reford Station
Detroit, MI 48219

D. ADC

Air Diffusion Council
230 North Michigan Avenue
Chicago, IL 6060l

E. AI
Asphalt Institute
Asphalt Institute Building
College Park, MD 20740

F. AISC
American Institute of Steel Construction
400 North Michigan Avenue
Eighth Floor
Chicago, IL 606ll

G. AISI
American Iron and Steel Institute
1000 16th St., N.W.
Washington, DC 20036

H. AMCA
Air Movement and Control Association
30 W. University Drive
Arlington Heights, IL 60004

I. ANSI
American National Standards Institute
l430 Broadway
New York, N.Y. 10018

J. APA
American Plywood Association
Box 11700
Tacoma, WA 984ll

K. ARI
Air Conditioning and Refrigeration Institute
1815 North Fort Meyer Drive
Arlington, VA 22209

L. ASHRAE
American Society of Heating, Refrigerating and Air Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, GA 30329

M. ASME
American Society of Mechanical Engineers
345 E. 47th St.
New York, NY 10017

N. ASPA

American Sod Producers Association
Association Building
Ninth and Minnesota
Hastings, NE 68901

O. ASTM
American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103

P. AWWA
American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

Q. AWI
Architectural Woodwork Institute
2310 South Walter Reed Drive
Arlington, VA 22206

R. AWPA
American Wood Preservers' Association
7735 Old Georgetown Road
Bethesda, MD 20014

S. CDA
Copper Development Association
57th Floor, Chrysler Building
405 Lexington Avenue
New York, NY 10174

T. CRSI
Concrete Reinforcing Steel Institute
933 Plum Grove Road
Schaumburg, IL 60l95

U. EJCDC
Engineers' Joint Contract Documents Committee
American Consulting Engineers Council
1050 15th Street, N.W.
Washington, DC 20005

V. FM
Factory Mutual System
1151 Boston Providence Turnpike
Norwood, MA 02062

W. FS
Federal Specification
General Services Administration
Specifications and Consumer Information Distribution Section (WFSIS)

Washington Navy Yard, Bldg. 197
Washington, DC 20407

X. IDOT
Illinois Department of Transportation Standard Specifications for Road and Bridge Construction

Y. IEEE
Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017

Z. IMIAC
International Masonry Industry All Weather Council
International Masonry Institute
815 15th St., N.W.
Washington, DC 20005

AA. IRSSW
Illinois Recommended Standards for Sewage Works

BB. MIL
Military Specification
Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120

CC. ML/SFA
Metal Lath/Steel Framing Association
221 North LaSalle Street
Chicago, IL 60601

DD. NAAMM
National Association of Architectural Metal Manufacturers
221 North LaSalle Street
Chicago, IL 60601

EE. NACE
National Association of Corrosion Engineers
http://web.nace.org

FF. NAPCA
National Association of Pipe Coating Applicators
8570 Business Park Drive, Suite 100
Shreveport, LA 71105

GG. NEMA
National Electrical Manufacturers' Association
2101 L Street, N.W.
Washington, D.C. 20037

HH. NFPA
National Fire Protection Association
Battery March Park
Quincy, MA 02269

II. NFPA
National Forest Products Association
1619 Massachusetts Avenue, N.W.
Washington, DC 20036

JJ. PCA
Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

KK. PCI
Prestressed Concrete Institute
201 North Wacker Dr.
Chicago, IL 60606

LL. PS
Product Standard
U.S. Department of Commerce
Washington, DC 20203

MM. SDI
Steel Door Institute
712 Lakewood Center North
Cleveland, OH 44107

NN. SJI
Steel Joist Institute
1703 Parham Road
Suite 204
Richmond, VA 23229

OO. SMACNA
Sheet Metal and Air Conditioning Contractors' National Association
8224 Old Court House Road
Vienna, VA 22180

PP. SSWSMCI
Standard Specifications For Water and Sewer Main Construction in Illinois

QQ. SSPC
Steel Structures Painting Council
4400 Fifth Avenue
Pittsburgh, PA 15213

RR. TAS
Technical Aid Series

Construction Specifications Institute
601 North Madison St.
Alexandria, VA 22314

SS. UL
Underwriters' Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Required Testing
2. General Quality Control
3. Workmanship
4. Manufacturers' Instructions
5. Manufacturers' Certificates
6. Manufacturers' Field Services
7. Testing Laboratory Services.

B. Related Requirements:
1. Section 01 30 00 - Administrative Requirements: Applicability of specified reference standards.
2. Section 01 33 00 - Submittal Procedures.
3. Section 01 42 19 - Reference Standards.
4. Section 01 60 00 - Product Requirements.

1.02 REQUIRED TESTING

A. Tests required for pavement
1. Proof roll subgrade after vegetation has been cleared and surficial topsoil and other decomposable plant matter has been removed. Proof rolling shall be witness by independent testing laboratory hired by Owner. Proof-roll shall be performed using a loaded dump truck or other approved piece of heavy construction equipment.
2. Nuclear density testing or other type of compaction testing, depending on subgrade material will be performed every lift of fill by independent testing laboratory hired by Owner.
3. Nuclear density testing will be performed on pavement by independent testing laboratory hired by Owner.

1.03 QUALITY CONTROL, GENERAL

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

1.04 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.05 MANUFACTURERS' INSTRUCTIONS

A. Comply with instructions in full detail, including each step in sequence. Request clarification from Engineer before proceeding if instructions conflict with Contract Documents.

1.06 MANUFACTURERS' CERTIFICATES

A. Submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.07 MOCKUPS

A. When required by individual Specification Section, erect complete, full scale mockup of assembly at Project site. Remove mockup at completion, when approved by engineer.

1.08 MANUFACTURERS' FIELD SERVICES

A. When manufacturer's field services are specified in individual Specification Sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations. Also refer to the requirements specified in Section 01 75 00 - Starting and Adjusting.

B. Representative shall submit written report to Engineer listing observations and recommendations. Reports must be submitted and accepted by Owner one month prior to the request for partial utilization or substantial completion.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
1. Products.
2. Product delivery requirements.
3. Product storage and handling requirements.
4. Product options.
5. Equipment electrical characteristics and components.
6. Substitutions

B. Related Requirements
1. Section 01 30 00 - Administrative Requirements.
2. Section 01 45 00 - Quality Control.
3. Section 01 77 00 - Closeout Procedures: Operation and Maintenance Data, Warranties and Bonds, Spare Parts.
4. Section 01 79 00 - Demonstration and Training.

1.02 PRODUCTS

A. Products include material, equipment, and systems.

B. At minimum, comply with specified requirements and reference standards.

C. Specified products define standard of quality, type, function, dimension, appearance, and performance required.

D. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.

E. Domestic Products: Except where specified otherwise, domestic products are required and interpreted to mean products mined, manufactured, fabricated, or produced in United States or its territories.

F. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.

G. Furnish interchangeable components from same manufacturer for components being replaced.

H. All materials and equipment furnished for this project shall be new unless otherwise required by the Contract Documents.

1.03 PRODUCT DELIVERY REQUIREMENTS

A. Comply with delivery requirements in Section 01 45 00 - Quality Control.

B. Transport and handle products according to manufacturer's instructions. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

C. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

D. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.04 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products according to manufacturer's instructions.

B. Store products with seals and labels intact and legible.

C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.

D. Exterior storage of fabricated products is not acceptable. Store in enclosed area with adequate ventilation and heat. Material and Equipment that is not stored properly will not be accepted.

E. Provide bonded off-Site storage and protection when Site does not permit on-Site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Energize panels or control boxes that have thermostatically controlled heaters. Energize motor space heaters.

H. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

I. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.

J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

K. Rotating shafts shall be turned on a regular basis.

1.05 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to procedures identified herein.

1.06 SUBSTITUTIONS

A. Only within 15 days after date established in Notice to Proceed will Engineer consider requests from Contractor for substitutions. Subsequently, substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.

B. Time is of the essence of the Contract for this project. The Contractor shall act diligently to obtain the required materials, articles, and pieces of equipment in a timely manner, so that the work of the project will not be delayed. Should the Contractor request permission to furnish a substitute material, article, or piece of equipment, he shall thereby assume full responsibility for any resulting delays, whether approval of the substitution is subsequently granted or denied.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. Request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
   2. Will provide the same warranty for substitution as for specified product.
   3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
   4. Waives claims for additional costs which may subsequently become apparent.

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

F. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

G. The Engineer may require the Contractor to furnish a special performance guarantee or other surety for the substitute material, article, or piece of equipment, as a condition for approval.

H. Only one request for substitution will be considered for each product. When substitution is not accepted, provide specified product.

I. No substitute material, article, or piece of equipment shall be purchased or installed by the Contractor without the Engineer's prior written approval. Should the Contractor furnish or install any substitute material, article, or piece of

equipment without obtaining the Engineer's prior written approval, and the Engineer subsequently deny such approval, the Contractor shall remove the substitute material, article, or piece of equipment and replace it with that identified on the Drawings or in the Specifications, without charge to the Owner.

J. Any additional construction or materials required by a particular manufacturer's design shall be included as part of the Contract Price and shall be furnished at no additional cost to the Owner.

1.07 SYSTEMS DEMONSTRATION

A. Prior to final inspection, demonstrate operation of each system to Engineer and Owner in accordance with Section 01 79 00 – Demonstration and Training.

1.08 OWNER SUPPLIED EQUIPMENT

A. For all owner supplied equipment, the Owner will be responsible for ordering, receiving delivery, storing the equipment, as well as payment for all start-up services.

B. The Contractor's responsibility shall include moving the equipment from the Owner's on-site storage location to the place of installation and complete wiring, piping, etc. that may be required for the equipment to be completely operational and ready for start-up. The Contractor shall also integrate/coordinate the installation of the Owner supplied equipment into the overall project schedule and provide the Owner with the schedule. The Contractor shall also coordinate the owner supplied equipment installation and startup with contractor supplied equipment.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Requirements and limitations for cutting and patching of work.

B. Related Requirements:
1. Section 01 30 00 - Administrative Requirements.
2. Section 01 60 00 - Product Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Non shrink, non-metallic, cement based grout.

B. Primary Products: Those required for original installation.

C. Submit product data for Engineer's review.

PART 3 - EXECUTION

3.01 GENERAL

A. Execute cutting, fitting, and patching, to complete work, and to:
1. Fit the several parts together, to integrate with other work.
2. Provide openings in elements of work for penetrations of mechanical work.

3.02 INSPECTION

A. Inspect existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing work, inspect conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.03 PREPARATION

A. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain excavations free of water.

3.04 PERFORMANCE

A. Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing.

B. Cut rigid materials using masonry saw or core drill. Pneumatic tools used to break out existing material will not be allowed without prior approval.

C. Restore work with new products in accordance with requirements of Contract Documents.

D. Fit work airtight unless otherwise shown to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

F. Seal the extra space to prevent leaks at the openings cut for piping sleeves.

END OF SECTION

SECTION 01 75 00

STARTING AND ADJUSTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Procedures for starting of mechanical and electrical systems

B. Related Requirements:
1. Section 01 30 00 - Administrative Requirements.
2. Section 01 45 00 - Quality Control.
3. Section 01 60 00 - Product Requirements.
4. Individual Sections - Specific requirements for startup.

1.02 QUALITY CONTROL

A. When manufacturer's field services are specified in individual sections, require manufacturer to provide authorized representative to be present at site (under provisions of Section 01 45 00 – Quality Control) to inspect, check, and approve equipment installation prior to start up; to supervise placing equipment in operation; and to provide a written report that equipment has been properly installed and lubricated, is in accurate alignment, is free from any undue stress imposed by connecting lines or anchor bolts, and has been satisfactorily operated under full load conditions.

1.03 SUBMITTALS

A. Submit preliminary schedule listing times and dates for startup of each item of equipment in sequence (2 weeks) prior to proposed dates.

B. Submit manufacturer's representative reports within one week after start up, listing satisfactory start up dates.

1.04 PROJECT CONDITIONS

A. Interdependent systems have been checked and are operational.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that Project conditions comply with requirements.

B. Verify that status of Work meets requirements for starting of equipment and systems.

3.02 PREPARATION

A. Coordinate sequence for startup of various items of equipment, including Owner provided equipment.

B. Notify Engineer seven days prior to startup of each item of equipment. Without penalty/change order, the Owner at his discretion may choose to deviate from the agreed startup scheduled due to over-riding treatment plant operations and maintenance requirements related to maintaining compliance with the plant's NPDES permit.

C. Have Contract Documents, shop drawings, product data, and operation and maintenance data at hand during entire start up process.

D. Verify that each piece of equipment has been checked for conditions which may cause damage.

E. Verify control systems are fully operational in automatic mode.

F. Verify that tests, meter readings, and specific electrical characteristics agree with those specified by electrical equipment manufacturer.

G. Verify that wiring to controls is complete.

H. Verify wiring and support systems for equipment installed is complete and checked.

I. Verify all connecting piping has been cleaned.

3.03 STARTING SYSTEMS

A. After all systems are operationally proven and tested by the Contractor, sub-contractors, and appropriate equipment representatives, the Contractor will provide a start-up schedule to the Owner for review and consideration.

B. Provide a minimum of five copies a written startup report duly signed by the equipment supplier and the general contractor. Provide these to the Owner / Owner's representative prior to the system demonstration per specification Section 01 79 00 – Demonstration and Training.

C. The Owner and Owner’s Representative will provide the contractor with additional information as requested to commission the system successfully.

D. Execute start up under supervision of responsible Contractor personnel.

END OF SECTION

SECTION 01 77 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Field engineering.
2. Closeout procedures.
3. Starting of systems.
4. Demonstration and instructions.
5. Testing, adjusting, and balancing.
6. Project record documents.
7. Operation and maintenance data.
8. Manual for materials and finishes.
9. Manual for equipment and systems.
10. Spare parts and maintenance products.
11. Product warranties and product bonds.
12. Examination.
13. Preparation.
14. Execution.
15. Cutting and patching.
16. Protecting installed construction.
17. Final cleaning.

1.02 FIELD ENGINEERING

A. Employ land surveyor registered in State of Illinois and acceptable to Engineer.

B. Owner will locate and Contractor shall protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.

C. Control datum for survey is established by Owner-provided survey as indicated on Drawings.

D. Prior to beginning Work, verify and establish floor elevations of existing facilities to ensure that new Work will meet existing elevations in smooth and level alignment except where specifically detailed or indicated otherwise.

E. Verify setbacks and easements; confirm Drawing dimensions and elevations.

F. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.

G. Submit copy of Site drawing signed by land surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.

H. Maintain complete and accurate log of control and survey Work as Work progresses.

I. On completion of foundation walls and major Site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and Site Work.

J. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.

K. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

L. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.03 CLOSEOUT PROCEDURES

A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
   1. Submit startup reports, maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this Section.
   2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in compliance with this Section.
   3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
   4. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
   5. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.
   6. Make final change-over of locks eliminating construction master-key system and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.
   7. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
   8. Perform final cleaning according to this Section.

B. Substantial Completion Inspection:
   1. When Contractor considers Work to be substantially complete, submit to Engineer:

a. Written certificate that Work, or designated portion, is substantially complete.
b. List of items to be completed or corrected (initial punch list).

2. Within seven days after receipt of request for Substantial Completion, Engineer and Owner will make inspection to determine whether Work or designated portion is substantially complete.
3. Should Engineer determine that Work is not substantially complete:
   a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
   b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Engineer.
   c. Engineer and Owner will reinspect Work.
   d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.
4. When Engineer finds that Work is substantially complete, Engineer will:
   a. Prepare Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and Owner (final punch list).
   b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
5. After Work is substantially complete, Contractor shall:
   a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
   b. Complete Work listed for completion or correction within time period stipulated.
6. Owner will occupy portions of building as specified in Section 01 30 00 – Administrative Requirements.

C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
1. When Contractor considers Work to be complete, submit written certification that:
   a. Contract Documents have been reviewed.
   b. Work has been examined for compliance with Contract Documents.
   c. Work has been completed according to Contract Documents.
   d. Work is completed and ready for final inspection.
2. Submittals: Submit following:
   a. Final punch list indicating all items have been completed or corrected.
   b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
   d. Accounting statement for final changes to Contract Sum.
   e. Contractor's affidavit of payment of debts and claims on AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
   f. Contractor affidavit of release of liens on AIA G706A - Contractor's Affidavit of Release of Liens.

g. Consent of surety to final payment on AIA G707 - Consent of Surety to Final Payment Form.

3. Perform final cleaning for Contractor-soiled areas according to this Section.

D. Final Completion Inspection:

1. Within seven days after receipt of request for final inspection, Engineer and Owner will make inspection to determine whether Work or designated portion is complete.
2. Should Engineer consider Work to be incomplete or defective:
   a. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
   b. Contractor shall remedy stated deficiencies and send second written request to Engineer that Work is complete.
   c. Engineer and Owner will reinspect Work.
   d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's and Owner's inspection.

1.04 STARTING OF SYSTEMS

A. Section 01 75 00 – Starting and Adjusting

B. Coordinate schedule for startup of various equipment and systems.

C. Unless otherwise specified, notify Engineer seven days prior to startup of each item.

D. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

E. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturer.

F. Verify that wiring and support components for equipment are complete and tested.

G. Execute startup under supervision of manufacturer's representative or Contractors' personnel according to manufacturer's instructions.

H. When specified in individual Specification Sections, require manufacturer to provide authorized representative who will be present at Site to inspect, check, and approve equipment or system installation prior to startup and will supervise placing equipment or system in operation.

I. Submit a written report according to Section 01 33 00 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.05 DEMONSTRATION AND INSTRUCTIONS

A. Section 01 79 00 – Demonstration and Training

B. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

C. Demonstrate Project equipment. Instruct in classroom environment located at existing administration building and instructed by manufacturer's representative who is knowledgeable about the Project.

D. Video Recordings: The Owner may elect, at their expense, Provide high-quality color video recordings of demonstration and instructional sessions. Engage commercial videographer to record sessions. Include classroom instructions, demonstrations, board diagrams, and other visual aids. Include menu navigation.

E. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

F. Use operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

G. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment or designated location.

H. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

I. Required instruction time for each item of equipment and system is specified in individual Specification Sections.

1.06 PROJECT RECORD DOCUMENTS

A. Maintain on Site two sets of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, product data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates used.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
   1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
   2. Include locations of concealed elements of the Work.
   3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
   4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
   5. Identify and locate existing buried or concealed items encountered during Project.
   6. Measured depths of foundations in relation to finish ground floor datum.
   7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   9. Field changes of dimension and detail.
   10. Details not on original Drawings.

G. Submit marked-up paper copy documents to Engineer before Substantial Completion.

H. Submit PDF electronic files of marked-up documents to Engineer with claim for final Application for Payment.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit five hard copies and three PDF composite electronic indexed files.

B. Submit data bound in 8-1/2 x 11-inch text pages, three D side ring binders with durable plastic covers.

C. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," title of Project**,** and subject matter of binder when multiple binders are required.

D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

F. Contents: Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by Specification Section. For each category, identify names,

addresses, and telephone numbers of Subcontractors and suppliers. Include the following:

a. Significant design criteria.
b. List of equipment.
c. Parts list for each component.
d. Operating instructions.
e. Maintenance instructions for equipment and systems.
f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
g. Safety precautions to be taken when operating and maintaining or working near equipment.

3. Part 3: Project documents and certificates, including the following:
   a. Shop Drawings and product data.
   b. Air and water balance reports.
   c. Certificates.
   d. Originals of warranties and bonds, notarized.

G. All contents shall be punched for binding in a manner that does not obliterate any data, or enclosed in suitable clear vinyl sheet protectors.

1.08 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project Site and place in location as directed by Owner; obtain receipt prior to final payment.

1.09 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers within ten days after completion of applicable item of Work.

B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include table of contents and assemble in three D side ring binder with durable plastic cover.

F. Submit five copies prior to final Application for Payment.

G. Time of Submittals:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.

2. Make other submittals within ten days after date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual Specification Sections.

D. Verify that utility services are available with correct characteristics and in correct locations.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.03 EXECUTION

A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.

B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.

2. Physically separate products in place, provide electrical insulation, or provide protective coatings to prevent galvanic action or corrosion between dissimilar metals.
3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual-effect choices to Engineer for final decision.

E. Allow for expansion of materials and building movement.

F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.

G. Mounting Heights: Where not indicated, mount individual units of Work at industry recognized standard mounting heights for particular application indicated.
1. Refer questionable mounting heights choices to Engineer for final decision.
2. Elements Identified as Accessible to Handicapped: Comply with applicable codes and regulations.

H. Adjust operating products and equipment to ensure smooth and unhindered operation.

I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

3.04 CUTTING AND PATCHING

A. Employ original installers to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting:
1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight-exposed elements.
5. Work of Owner or separate contractor.

C. Execute cutting, fitting, and patching to complete Work and to:
1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and nonconforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products according to requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

I. At penetrations of fire-rated walls, partitions, ceiling, or floor construction, completely seal voids with fire-rated material to full thickness of penetrated element.

J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

K. Identify hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

3.05 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual Specification Sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

3.06 FINAL CLEANING

A. Execute final cleaning prior to final Project assessment.
   1. Employ experienced personnel or professional cleaning firm.

B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces.

C. Clean equipment and fixtures to sanitary condition with appropriate cleaning materials.

D. Replace filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean Site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from Site.

END OF SECTION

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SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Procedures for demonstration of equipment operation and instruction of Owner's personnel.

B. Related Requirements:
1. Section 01 30 00 - Administrative Requirements.
2. Section 01 60 00 - Product Requirements: Systems Demonstration
3. Section 01 75 00 - Starting and Adjusting.
4. Section 01 77 00 - Contract Procedures: Operation and Maintenance Data.
5. Individual Sections - Specific requirements for demonstrating systems and equipment.

1.02 QUALITY ASSURANCE

A. For all items specified in Divisions 26 and 40, provide authorized manufacturer's representative to demonstrate operation of equipment systems, instruct Owner's personnel, and provide written report that demonstrations and instructions have been completed.

B. Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed upon times.

1.03 SUBMITTALS

A. Submit preliminary schedule for Owner's approval, listing times and dates for demonstration of each item of equipment and each system, two weeks prior to proposed dates.

B. Submit records within two weeks after completion of demonstrations, that demonstrations and instructions have been satisfactorily completed. Give time and date of each demonstration, and hours devoted to demonstration, with a list of persons present.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify equipment has been inspected and put into operation in accordance with Section 01 75 00 – Starting and Adjusting; testing, adjusting, and balancing has been performed and startup reports submitted in accordance with Section

01 75 03 - Testing, Adjusting, and Balancing, and equipment and systems are fully operational.

B. Have copies of approved operation and maintenance manuals at hand for use in demonstrations and instructions.
   1. Provide manual to Engineer and District personnel one month before demonstration for review and approval.

3.02 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of equipment and systems to Owner's personnel a minimum of 2 weeks prior to the substantial completion date. For equipment requiring seasonal operation, perform instructions for all seasons.

B. A minimum of two 4 hour training courses are to be conducted. One training class is to be held in the morning; one in the afternoon in coordination with facility shift schedules. The training is to be scheduled a minimum of two weeks prior to the anticipated training date. An outline is to be provided a minimum of one week prior to the anticipated training date. Training will not be scheduled until the startup reports are provided and signed by the equipment supplier and the contractor. The Owner may elect to videotape the training.

C. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start up, operation, control, adjustment, trouble shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled times, at equipment location.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

3.03 TIME ALLOCATED FOR INSTRUCTIONS

A. The amount of time required for instruction is a minimum of two 4 hours sessions, one in the morning and one in the afternoon unless a longer time is required in individual specification sections.

END OF SECTION

DIVISION 03

CONCRETE

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for footings, walls, slabs-on-ground, equipment pads, and sidewalks.

B. Work on this project shall conform to all requirements of ACI 301-10 'Specifications for Structural Concrete' published by the American Concrete Institute, Farmington Hills, Michigan, except as modified by these Contract Documents.

C. Contractor shall keep in his field office for reference a copy of ACI SP-15(10) 'Field Reference Manual'.

1.02 SUBMITTALS

A. Qualification Data: For installer and manufacturer.

B. Material Certificates/ Test Reports: For each of the following:
1. Cementitious materials.
2. Aggregates.
3. Admixtures.
4. Form materials and form-release agents.
5. Steel reinforcement and accessories.
6. Waterstops.
7. Curing compounds.
8. Bonding agents.
9. Joint-filler strips.
10. Repair materials.

C. Design Mixtures: For each concrete mixture.

D. Shop Drawings: Detailing and Placement drawings for steel reinforcement.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

G. Propose construction layout, location of construction joints subject to Engineer's approval.

H. Samples: For waterstops, vapor retarder.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Installer Qualifications: A qualified installer who employs on project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301-10, 'Specification for Structural Concrete.'
   2. ACI 117-10, 'Specifications for Tolerances for Concrete Construction and Materials.'
   3. ACI SP-15(10), 'Specifications for Structural Concrete (ACI 301-10) with Selected ACI References.'

E. Preinstallation Conference: Conduct conference at Project site.

PART 2 PRODUCTS

2.01 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

2.02 STEEL REINFORCEMENT

A. Deformed Reinforcing Bars: ASTM A615, grade 60 ksi yield strength.

B. Welded Wire Reinforcement: Plain ASTM A185, flat sheet.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I/Type II, supplemented by:
      a. Fly Ash: ASTM C618, Class C or F.
      b. Slag Cement: ASTM C989, Grade 100 or 120.
      c. Silica Fume: ASTM C1240.

B. Normal-Weight Aggregates: ASTM C33.
   1. Coarse Aggregate: 1-1/2-inch or 3/4-inch nominal maximum size.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
   3. Chert content in aggregate: For walls 3%, for flat work less than 3%.

C. Water: Potable.

D. Air-Entraining Admixture: ASTM C260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C494, Type A.
   2. Retarding Admixture: ASTM C494, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C494, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

2.04 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E1745, or polyethylene sheet, ASTM D4397, not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

2.05 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.06 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips:
1. For Walls and Slabs: ASTM D1751 asphalt-saturated cellulosic fiber, or ASTM D1752 Type I sponge rubber.
2. Walkways and Curbing: ASTM D994, asphaltic, 3/8 inch thick.

2.07 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned based on laboratory trial mixture or field test data, or both, according to ACI 301. See Table 1 on following page for durability requirements of concrete mixtures.

B. Controlled Low Strength Material (CLSM):
1. Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, Article 1019, Mix 2.
2. Use: Backfill for interior cavities.
3. Compressive Strength: 30 PSI.

TABLE 1

Durability Requirements of Concrete Mixtures

Mix No.	Concrete Type	Class of Exposure Category	28-Day Strength (f'_c) (Note 4)	Nominal Maximum Aggregate Size	Total Air Content (%)	Maximum W/CM ratio (Note 6)	Reference Notes	Max. water soluble Chloride ion (Note 7)
1	Footings @ interior & along building perimeter	C1, F2, S1, P0	4500 psi	3/4”	6.0	0.45	Notes 2 & 3	0.3
2	Foundation walls	C1, F2, S1, P0	4500 psi	3/4”	6.0	0.45	Notes 2 & 3	0.30
3	Interior Slabs-on-ground	C0, F0, S1, P0	4500 psi	3/4”	Note 1	0.50	Notes 2, 3, & 5	1.0

4	Misc. Interior Concrete	C0, F0, S1, P0	4500 psi	3/4”	Note 1	0.5	Notes 2 & 3	1.0
5	Misc. Exterior Concrete	C1, F2, S1, P0	4500 psi	3/4”	6.0	0.45	Notes 2 & 3	0.30

1. Concrete to receive a hard trowel finish shall not contain an air entraining admixture and shall not have a total air content greater than 3 percent. For concrete not receiving a hard trowel finish, the total air content shall be 5% (commensurate with a Class F1 exposure Category) in order to improve durability and workability.
2. The Tricalcium Aluminate (C_3A) content in cement shall be limited to a maximum of 8.0 percent corresponding to a Class S1 moderate sulfate (SO_4) exposure.
3. Admixtures containing calcium chloride shall not be permitted.
4. 7-day compressive strength shall be 3800 PSI.
5. Minimum cementitious materials content for slabs-on-ground shall be 540 lb/cubic yard for ¾” nominal size aggregate mix.
6. Water to Cementitious materials ratio by weight.
7. Maximum water-soluble chloride ion (Cl^-) content in concrete, percent by weight of cement.

2.08 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.09 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 90 to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.03 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E1643 and manufacturer's written instructions.
   1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.04 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.05 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, and other locations, as indicated.

3.06 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Request acceptance of proposed cold-weather placement, temperature measuring methods, and protection activities.

D. Hot-Weather Placement: Request acceptance of proposed hot-weather placement, temperature measuring methods, and protection activities.

3.07 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.08 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 301 recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to all surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces exposed to view.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot-long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.09 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with requirements of Paragraph 5.3.6 of ACI 301.

3.10 CONCRETE SURFACE REPAIRS

A. General: Repair tie holes and surface defects in accordance with requirements of Paragraph 5.3.7 of ACI 301.

B. Defective Concrete: Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION

DIVISION 26

ELECTRICAL

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SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SUMMARY

A. Work Included:
1. Section includes building wire and cable; nonmetallic-sheathed cable; service entrance cable; and wiring connectors and connections.

B. Related Sections:
1. Section 26 05 29 – Hangers and Supports for Electrical Systems – Supporting Devices
2. Section 26 05 33 – Raceway and Boxes for Electrical Systems
3. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification.

1.02 REFERENCES

A. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. American Society for Testing and Materials, (ASTM):
1. ASTM B 8 – Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft.
2. ASTM D1248 – Standard Specification for Polyethylene Plastic Molding and Extrusion Material.
3. ASTM D3485 – Specification for Smooth-Wall Coilable Polyethylene (PE) Conduit (Duct) for Preassembled Wire and Cable.

C. Federal Specifications, (FS):
1. FS HH-I-595 – Insulation Tape, Electrical, Pressure Sensitive Adhesive, Plastic.

D. Insulated Cable Engineers Association (ICEA, formally IPCEA):
1. ICEA S-66-524 – Cross-Linked-Thermosetting-Polyehtylene-Insulated.
2. ICE S-73-532 – Standard for Control, Thermocouple Extension, and Instrumentation Cables.
3. ICEA S95-685 – Power Cables Rated 2000Volts or Less for the Distribution of Electrical Energy.
4. ICEA T-29-520 – Flame Test.

E. International Electrical Testing Association (NETA):
1. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

F. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.
2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

G. National Electrical Contractors Association, (NECA): Standard of Installation.

H. Underwriters Laboratories (UL):
1. UL 44 – Thermoset-Insulated Wires and Cables
2. UL 83 – Thermoplastic-Insulated Wires and Cables
3. UL 514B – Standard for Safety Conduit, Tubing and Cable Fittings
4. UL 854 – Standard for Service-Entrance
5. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
6. UL 1581 – Reference Standard for Electrical Wires, Cables, and Flexible Cords
7. Applicable listings

1.03 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
1. Stranded conductor for feeders and branch circuits 10 AWG and smaller.
2. Stranded conductors for control circuits.
3. Conductor not smaller than 12 AWG for power and lighting circuits.
4. Conductor not smaller than 14 AWG for control circuits.
5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet (25 m).
6. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (160 m).
7. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

B. Wiring Methods: Provide the following wiring methods:
1. Use only building wire, Type and Insulation in raceway as specified under Section 2.
2. Cable Tray Locations: Use only Tray Cable Type TC.

1.04 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper unless indicated as aluminum or "AL".

1.05 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.

B. Product Data: Submit for building wire and cable.

C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.

D. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.

E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

F. Test Reports: Indicate procedures and values obtained.

1.06 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Closeout Procedures: Requirements for submittals.

B. Project Record Documents: Record actual locations of components and circuits.

1.07 QUALIFICATIONS

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

1.08 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle Products to site under provisions of Section 01 60 00.

B. Deliver wire and cables in full reels protected against injury. Deliver reels with factory attached UL approved tags showing the manufacturer's name and the type of insulation, size, and length or wire in each coil or reel.

C. Accept wire and cable on site in manufacturer's packaging. Inspect for damage.

D. Store and protect in accordance with manufacturer's instructions.

E. Protect from weather. Provide adequate ventilation to prevent condensation.

1.10 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.11 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Determine required separation and cable routing to avoid interference with other work.

C. Determine cable routing to avoid interference with other work.

D. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

E. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft (3 m) of length shown.

PART 2 PRODUCTS

2.01 BUILDING WIRE

A. Manufacturers:
1. General Cable; General Cable Corporation.
2. The Okonite Company.
3. Southwire Company
4. Service Wire Co.
5. Substitutions: per Section 01 60 00 – Product Requirements.

B. Product Description: Single conductor, Class B strand, insulated wire.

C. Conductor: Copper.

D. Insulation Voltage Rating: 600 volts.

E. Insulation: NFPA 70
1. Type XHHW-2 with heat and moisture resistant thermoplastic insulation.

2.02 TRAY CABLE

A. Manufacturers:
1. General Cable; General Cable Corporation.
2. The Okonite Company.
3. Southwire Company
4. Service Wire Co.
5. Substitutions: per Section 01 60 00 – Product Requirements.

B. Product Description: Multiconductor power and control cable NFPA 70 Type TC.

C. Conductor: Copper.

D. Insulation: Flame-retardant cross-linked polyethylene.

E. Overall Jacket: Polyvinyl Chlorine (PVC) in accordance with UL 1277.

F. Insulation Voltage Rating: 600 volts.

G. Insulation Temperature Rating: 90 degrees C.

H. Listings: Finished cable UL listed as Type TC, and sunlight resistant.

2.03 SIGNAL CABLE

A. Manufacturers:
1. Belden Inc.
2. General Cable; General Cable Corporation.
3. Substitutions: per Section 01 60 00 – Product Requirements.

B. Product Description: 2 and 3 conductor insulated wire, multi-conductor, shielded cable, or multi-pair signal cable with individual pair shielding and overall shield.

C. Conductor: Tinned copper with 7-strand concentric Class B stranding, not smaller than #16 AWG.

D. Insulation: 15 mil PVC or polyethylene insulation with an overall sunlight-resistant PVC jacket, rated for 600 volts.

E. Number of conductors or conductor pairs: as shown on plans drawings. Each conductor or conductor pair shall be color coded.

F. Shield: Paired conductors are to have an aluminum-polyester foil shield with a tinned copper drain wire and an overall cable shield of aluminum-polyester foil. 2 and 3 conductor cables to have an overall shield of aluminum-polyester.

2.04 TERMINATIONS

A. Install terminal lugs on ends of 600-volt wires unless lugs are provided on connected device, such as circuit breakers.

B. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

C. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

D. Size lugs per manufacturer recommendation for wire sizes terminated. Install 2-hole type lugs to connect wires No. 4 and large to copper bus bar.

E. Terminal lugs which are fastened together, as on motors, transformers, and other apparatus, or when the space between studs is so small that lugs can turn and touch each other, to be insulated for a dielectric strength of 2-1/2 times the normal potential of the circuit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

B. Verify interior of building has been protected from weather.

C. Verify mechanical work likely to damage wire and cable has been completed.

D. Verify raceway fill is in compliance with NFPA 70.

E. Verify raceway installation is complete and supported.

3.02 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.03 INSTALLATION

A. Section 01 40 00 – Quality Control: Manufacturer's instructions.

B. Install wire and cable in accordance with the NECA "Standard of Installation".

C. Install wire and cable required to connect power, branch, control, and signal circuits as indicated and as specified.

D. Install products in accordance with manufacturer's instructions.

E. Route wire and cable to meet Project conditions.

F. Neatly train and lace wiring inside boxes, equipment, and panelboards.

G. Support wire and cable when a number of single conductor wires ae trained through a box, manhole, or handhole.

H. Fixture Wire: In compliance with ANSI/NFPA 70.

I. Install stranded conductors for feeders and branch circuits 8 AWG and larger.

J. Install solid conductor for feeders and branch circuits 10 AWG and smaller.

K. Install stranded conductors for branch circuit 10 AWG and smaller. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

L. Install stranded conductors for control circuits.

M. Install conductor not small than 12 AWG for power and lighting circuits.

N. Install conductor not smaller than 14 AWG for control circuits.

O. Install 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet (25 m).

P. Install 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (160 m).

Q. Provide slack in each run for contraction and expansion of wires.

R. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

S. Special Techniques--Building Wire in Raceway:
1. Protect exposed wire and cable from damage.
2. Pull conductors into raceway at same time.
3. Use cable grips or other devices to distribute the strain to the conductor, insulation, and jacket.
4. Use fish tapes, cable grips, and other devices used to pull wires having no sharp projections that will scratch or otherwise injure raceway interior.
5. Install building wire 4 AWG and larger with pulling equipment.

T. Special Techniques - Cable:
1. Protect exposed cable from damage.
2. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
3. Use suitable cable fittings and connectors.

U. Special Techniques – Wiring Connections:
1. Clean conductor surfaces before installing lugs and connectors.
2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
7. Materials used for splices shall be compatible with the conductors, insulators and protective jackets. Splices shall insulate and protect the conductors as much as the insulation and protective jackets of the individual wires and cables.
8. Splices in signal cables shall be nylon, self-insulated, crimp type for individual conductors, with an overall covering of plastic tape, heat shrinkable plastic sleeve, or powered epoxy, installed in accordance with manufacturer’s recommendations.

V. Install stranded conductors for feeders and branch circuits 8 AWG and larger.

W. Install solid conductors for branch circuits 10 AWG and smaller. If stranded conductors are used, install crimp-on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

X. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.

Y. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bar.

Z. Lugs for wires 4 AWG and larger shall be color keyed, 2 hole type, compression type copper, with insulating sealing collars.

AA. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.05 WIRE COLOR

A. General:
   1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
      a. Black and red for single phase circuits at 120/240 volts.
      b. Black, red, and blue for circuits at 120/208 volts single or three phase.
      c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
   2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
      a. Black and red for single phase circuits at 120/240 volts.
      b. Black, red, and blue for circuits at 120/208 volts single or three phase.
      c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
   1. For 6 AWG and smaller: Green.
   2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.06 FIELD QUALITY CONTROL

A. Section 01 45 00 – Quality Control; Section 01 70 00 - Closeout Procedures: Field inspecting, testing, adjusting, and balancing.

B. Perform field inspection and testing.

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

E. Inspect wire and cable for physical damage and proper connection.

F. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

G. Verify continuity of each branch circuit conductor.

END OF SECTION

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SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Rod electrodes.
2. Grounding conductors.
3. Mechanical connectors.
4. Exothermic connections.
5. Equipment grounding conductors.
6. Bonding methods and materials.

B. Related Sections:
1. Section 26 05 53 – Identification for Electrical Systems.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM E814 – Test Method for Fire Test of Through-Penetration Fire Stop

B. Institute of Electrical and Electronics Engineers (IEEE):
1. IEEE C2 – National Electrical Safety Code
2. IEEE 80 – Guide for Safety in AC Substation Grounding
3. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
4. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

C. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Electrical Contractors Association (NECA):
1. NECA Standard of Installation

E. National Electrical Manufacturers Association (NEMA):
1. NEMA 250 – Enclosures for Electrical Equipment (1,000 Volts Maximum)

F. National Fire Protection Association (NFPA):
1. NFPA 70 - National Electrical Code.
2. NFPA 70E – National Electrical Safety Code.

G. Underwriters Laboratories (UL):

1. UL 467 – UL Standard for Safety for Grounding and Bonding Equipment
2. Applicable listings

1.03 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:
   1. Metal underground water pipe.
   2. Metal building frame.
   3. Concrete-encased electrode.
   4. Ground ring.
   5. Rod electrode.
   6. Metal underground gas piping system.

B. Multiple vertical electrodes buried in rectangular pattern around perimeter of building foundation as indicated on plan drawings.

1.04 DESIGN REQUIREMENTS

A. Construct and test grounding systems in accordance with the referenced standards.

B. Grounding: Conform to IEEE 142.

C. Substation Grounding: Conform to IEEE 80.

D. Select materials, sizes, and types of anchors, fasteners, and supports to carry the loads of equipment and raceway, including weight of wire and cable in raceway.

1.05 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms maximum.

1.06 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate layout of grounding system and installation details.

C. Product Data: Submit data on grounding electrodes and connections.

D. Test Reports:
   1. Indicate procedure and values obtained.
   2. Indicate overall resistance to ground and resistance of each electrode.

E. Manufacturer's Installation Instructions: Submit for active electrodes.

F. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.07 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Executive and Closeout Requirements: Requirements for submittals.

B. Manufacturer's field reports.

C. Project Record Documents: Record actual locations of components and grounding electrodes.

D. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.08 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL label.

B. Maintain one copy of each document on site.

1.09 QUALIFICATIONS

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

B. Installer: Company specializing in performing work of this section with minimum five years documented experience approved by manufacturer.

1.10 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.11 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 – Administrative Requirements: Pre-installation meeting

B. Convene minimum one week prior to commencing work of this section.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.13 COORDINATION

A. Section 01 30 00 – Administrative Requirements: Requirements for coordination.

B. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 PRODUCTS

2.01 ROD ELECTRODES

A. Manufacturers:
1. Copperweld.
2. ERICO International Corporation.
3. ITT Blackburn.
4. Substitutions: Per Section 01 60 00 – Product Requirements.

B. Product Description:
1. Material: Copper-clad steel.
2. Diameter: 3/4 inch (19 mm).
3. Length: 10 feet (3 m).

C. Connector: Connector for exothermic welded connection.

2.02 GROUNDING CONDUCTORS

A. Material: Stranded copper.

B. Foundation Electrodes: 4/0 AWG, bare copper conductor.

C. Grounding Electrode Conductor: Bare copper conductor, size not less than required by NFPA 70.

D. Bonding Conductor: Bare copper conductor.

E. Grounding Conductor Insulation: 600 V, unless otherwise specified or indicated.

2.03 MECHANICAL CONNECTORS

A. Manufacturers:
1. ERICO International Corporation
2. Burndy; part of Hubbell Electrical Systems.
3. O-Z Gedney.
4. Substitutions: Per Section 01 60 00 – Product Requirements.

B. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.04 EXOTHERMIC CONNECTIONS

A. Manufacturers:
1. ERICO International Corporation
2. Burndy; part of Hubbell Electrical Systems.
3. Substitutions: Per Section 01 60 00 – Product Requirements.

B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify final backfill and compaction has been completed before driving rod electrodes.

C. Verify routing and termination locations of cable prior to rough-in.

D. Electrode locations and cable routing are shown on drawings in approximate locations unless dimensioned.

3.02 PREPARATION

A. Remove paint, rust, mill oils, and other surface contaminants at connection points.

3.03 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

3.04 INSTALLATION

A. Section 01 45 00 – Quality Control: Manufacturer’s instructions.

B. Install grounding and bonding to meet Regulatory Requirements.

C. Install in accordance with IEEE 142 and IEEE 1100.

D. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes where required to achieve specified resistance to ground.

E. Install grounding and bonding conductors concealed from view.

F. Install grounding electrode conductor and connect to reinforcing steel in foundation footing as indicated on Drawings. Electrically bond steel together.

G. Bond together metal siding not attached to grounded structure; bond to ground.

H. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

I. Supplement grounding connection by bonding to the metal underground water pipe system, to an effectively grounded metal building frame, and to the interior metal cold water piping system. A water piping system shall not be used as the sole grounding electrode because it may be isolated or insulated.

J. Make connections to rod electrodes and to building structural steel using exothermic connections. Wrap exothermic connections with 4 layers of electrical tape and overlap the conductor insulation at least 4 inches.

K. Grounding conductor connections to piping systems, ductwork, or other equipment shall be made with grounding connections and shall be accessible for inspections and maintenance.

L. Metal conduits carrying grounding conductors shall be bonded to the conductors.

M. Ground the neutral of each electrical distribution system on the supply side of the disconnecting device.

N. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.

O. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

P. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.

Q. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

R. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.

S. Permanently attach equipment and grounding conductors prior to energizing equipment.

T. Install rod electrodes in vertical position with bottom at least 5 feet (1600 mm) below frost line.

U. Install grounding conductors outside of structures 2 feet (600 mm) below frost line.

V. Install multiple electrodes forming a grounding field a minimum of 10 feet (3 m) apart.

W. Make grounding connections to driven ground rods.

X. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

Y. Equipment Grounding Conductor: In all non-metallic conduits, provide a separate, insulated grounding conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

Z. Connect to site grounding system.

3.05 FIELD QUALITY CONTROL

A. Sections 01 45 00 - Quality Control and 01 77 00 - Closeout Procedures: Field inspecting, testing, adjusting, and balancing.

B. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

C. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer’s recommendations using the fall-of-potential method.

D. Inspect and test in accordance with NETA ATS, except Section 4.

E. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

F. Perform ground resistance testing in accordance with IEEE 142.

G. Perform leakage current tests in accordance with NFPA 99.

H. Perform continuity testing in accordance with IEEE 142.

I. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

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SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Conduit supports.
2. Anchors and fasteners
3. Formed steel channel.
4. Concrete Inserts
5. Sleeves.
6. Mechanical sleeve seals.
7. Firestopping relating to electrical work
8. Firestopping accessories

B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section

1.02 REFERENCES

A. ASTM International:
1. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
3. ASTM A924/A924M – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
5. ASTM E119 – Standard Method for Fire Tests of Building Construction and Materials
6. ASTM E814 – Standard Test Method of Fire Tests of Through Penetration Firestops
7. ASTM E1966 – Standard Test Method for Fire-Resistive Joint Systems

B. Factory Mutual Engineering Corporation (FM):
1. FM – Approval Guide, A Guide to Equipment, Materials & Services Approved by Factory Mutual Research For Property Conservation.

C. Institute of Electrical and Electronic Engineers (IEEE):
1. ANSI/IEEE C2 – National Electrical Safety Code
2. IEEE 80 – Guide for Safety in AC Substation Grounding
3. IEEE 142 – Grounding of Industrial and Commercial Power Systems

D. National Contractors Association (NECA):

1. NECA Standard of Installation

E. National Electrical Manufacturers Association (NEMA):
1. NEMA 250 – Enclosures for Electrical Equipment (1,000 Volts Maximum)

F. National Fire Protection Association (NFPA):
1. NFPA 70 – National Electrical Code

G. International Electrical Testing Association (NETA):
1. ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

H. Underwriters Laboratories (UL):
1. UL – Fire Resistance Directory
2. UL 263 – Fire Tests of Building Construction and Materials
3. UL 723 – Test for Surface Burning Characteristics of Building Material
4. UL 1479 – Fires Tests of Through – Penetration Firestop
5. UL 2079 – Tests for Fire Resistance of Building Joint Systems

I. Warnock Hersey (WH):
1. WH – Certification Listings

1.03 DESIGN REQUIREMENTS

A. Select materials, sizes, and types of anchors, fasteners, and supports to carry the loads of equipment and raceway, including weight of wire and cable in raceway.

1.04 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.

C. Product Data:
1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
2. Anchors and Supports: Submit manufacturer’s catalog data for fastening components. Indicate installation methods.
3. Firestopping: Submit data on product characteristics, performance and limitation criteria.

D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating adjacent assembly.

E. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.

F. Manufacturer's Installation Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.
2. Firstopping: Submit preparation and installation instructions.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Maintain one copy of each document on site.

1.06 QUALIFICATIONS

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

B. Installer: Company specializing in performing work of this section with minimum five years documented experience approved by manufacturer.

1.07 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.08 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Closeout Procedures: Requirements for contract closeout

B. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

C. Maintenance Data: Identify local spare part sources.

1.09 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

PART 2 PRODUCTS

2.01 CONDUIT SUPPORTS

A. Manufacturers:
1. Adalet.
2. Carlon Electrical Products.
3. ERICO International Corporation.
4. Minerallac Company.
5. MIRO Industries.
6. Thomas & Betts Corporation.
7. Unistrut; Atkore International.
8. Substitutions: Section 01 60 00 - Product Requirements.

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

E. Conduit clamps - general purpose: One-hole malleable iron for surface mounted conduits.

F. Cable Ties: High strength nylon temperature rated to 185 degrees F (85 degrees C), Self-locking.

2.02 ANCHORS AND FASTENERS

A. Materials and Finishes: Corrosion resistant.

B. Expansion Anchors:
1. Steel wedge type not less than ¼ in (6 mm) size.
2. Size to extend at least 3 in (75 mm) into concrete or masonry.

2.03 FORMED STEEL CHANNEL

A. Manufacturers:
1. Allied Support Systems.
2. Cooper B-Line, Inc.
3. Unistrut; Atkore International.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: 1-5/8 inch (41 mm) by 1-5/8 in (41 mm) galvanized steel, 12 gage (2.8 mm) thick with holes 1-1/2 inch (38 mm) on center or as indicated.

2.04 CONCRETE INSERTS

A. Manufacturer:

1. Cooper B-Line, Inc.
2. Unistrut; Atkore International.
3. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Heavy duty continuous slotted channel concrete inserts. Galvanized steel 12 gage (2.8 mm) thick, with integral anchors at 6 inch (150 mm) centers.

C. Inserts for individual hangers: Galvanized malleable iron.

D. Nuts: Removable type held in place by V-type teeth.

E. Cover Plates: Snap on type, factory finished steel. Provide on channel inserts between support attachments.

2.05 SLEEVES

A. Sleeves for Conduit Through Non-Fire Rated Floors: 18 gage (1.2 mm) thick galvanized steel.

B. Sleeves for Conduit Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage (1.2 mm) thick galvanized steel.

C. Sleeves for Conduit Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

D. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.06 MECHANICAL SLEEVE SEALS

A. Manufacturers:
1. ThunderLine, Link-Seal, Inc..
2. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

C. Seal Element: EPDM

D. Pressure Plates: Composite

E. Nuts and Bolts: 316 Stainless Steel

F. Temperature Range: Minus 40 to 250 degrees F (minus 40 to 121 degrees C)

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install damming material to arrest liquid material leakage.

D. Do not use powder-actuated anchors.

E. Do not drill or cut structural members.

3.03 INSTALLATION

A. Section 01 45 00- Quality Control: Manufacturer’s instructions.

B. Install Products in accordance with manufacturer’s instructions.

3.04 INSTALLATION - HANGERS AND SUPPORTS

A. Anchors and Fasteners:
   1. Concrete Structural Elements: Provide precast inserts, expansion anchors and preset inserts.
   2. Steel Structural Elements: Provide beam clamps, steel ramset fasteners, and welded fasteners.
   3. Concrete Surfaces: Provide expansion anchors.
   4. Concrete Hollow Core Slab Units:
      a. For fixtures and ancillary conduit, 50 lbs (22 kg) maximum provide toggle bolts in hollow cells.
      b. For heavier items provide through-bolts in hollow cells with bearing plates on top surface.
   5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts.
   6. Solid Masonry Walls: Provide expansion anchors and preset inserts.
   7. Sheet Metal: Provide sheet metal screws.
   8. Wood Elements: Provide wood screws.
   9. Do not use spring steel clips and clamps.
   10. Do not use chain, wire or perforated strap hangers.

B. Inserts:

1. Install inserts for placement in concrete forms.
2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

C. Install surface mounted cabinets and panelboards with minimum of four anchors.

D. In wet and damp locations, install steel channel supports to stand cabinets and panelboards 1 inch (25 mm) off wall.

E. Install sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

F. Support frames and anchors for mounting equipment to be furnished by the Contractor and approved by the Engineer.

G. Raceway Surface Mounted:
1. Support by one-hole, malleable iron clamps with clamp backs which provide clearance between the raceway and the mounting surface.
2. Support by trapeze, ring, or clevis hangers. Supports for raceway 2 in (50 mm) and smaller shall be zinc plated adjustable swivel ring hangers, and for larger raceways supports shall be galvanized adjustable clevis type hangers.

H. Trapeze Hangers:
1. Structural channels, angle irons, or formed steel channel shapes with raceways held in place by U-bolts, clips, or clamps.
2. Members hot dipped galvanized after fabrication.
3. Grind and dressed hanger edges.
4. Install end caps on field cut edges.

I. Install conduit and raceway support and spacing in accordance with NEC.

J. Support coated conduit with PVC coated fasteners and supports.

K. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

L. Install multiple conduit runs on common hangers.

M. Supports:
1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
2. Install surface mounted cabinets and panelboards with minimum of four anchors.

3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch (25 mm) off wall.
4. Support vertical conduit at every floor.
5. Support PVC-coated conduit with PVC-coated fasteners and supports.

3.05 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 4 inches (100 mm) thick and extending 6 inches (150 mm) beyond supported equipment.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

3.06 INSTALLATION - SLEEVES

A. Use galvanized sheet metal sleeves in hollow wall penetrations to provide a backing for sealant. For masonry construction, grout area around sleeve.

B. Install rigid metallic sleeves where exposed raceways pass through ceilings, floors, and walls (except exterior walls below grade).

C. Refer to Section 26 05 33 – Raceway and Boxes for Electrical Systems for wall seals.

D. Exterior watertight entries: Seal with adjustable interlocking rubber links.

E. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.

F. Set sleeves in position in forms. Provide reinforcing around sleeves.

G. Size sleeves to accommodate their through penetrating items and allow a minimum of a 1 inch (25 mm) void between the sleeve and the item of penetration.

H. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

I. Extend sleeves through floors 3 inch (75 mm) above finished floor level, and 1 inch (25 mm) each side of finished walls. Caulk sleeves.

J. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with stuffing insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

K. Install stainless steel escutcheons at finished surfaces.

3.07 FIELD QUALITY CONTROL

A. Inspect installed firestopping for compliance.

3.08 CLEANING

A. Section 01 77 00 - Closeout Procedures: Requirements for cleaning.

B. Clean adjacent surfaces of firestopping materials.

3.09 PROTECTION OF FINISHED WORK

A. Section 01 77 00 - Closeout Procedures: Requirements for protecting finished Work.

B. Protect adjacent surfaces from damage by material installation.

3.10 SCHEDULES

A. Hanger rods shall be of adequate size, not less than 3/8 in (10 mm), galvanized, and furnished in the quantity shown in the following tabulation:

Length of Hanger, In (mm)	Number of Bolts or Rods
36 (900) and Less	3
Greater than 36 (900) and Less than 48 (1200)	3
Greater than 48 (1200)	4

B. Space supports for exposed rigid conduit as follows:

Conduit Size Inches (mm)	Number Of Conduits	Maximum Spacing of Supports, Ft (mm)	
		Horizontal	Vertical
1/2 (13 mm) & 3/4 (19 mm)	1 or 2	7 (2100)	7 (2100)
	3 or More	5 (1500)	7 (2100)
1 (25 mm) & 1-1/4 (32 mm)	1 or 2	10 (3000)	8 (2400)
	3 or More	6 (1800)	8 (2400)
1-1/2 (38 mm) and Larger	1 or 2	10 (3000)	10 (3000)
	3 or More	6 (1800)	10 (3000)

END OF SECTION

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Raceway:
      A. Metal conduit.
      B. Liquid tight flexible metal conduit.
      C. Rigid non-metallic conduit.
      D. Wireways.
      E. Conduit fittings.
      F. Expansion fittings.
      G. Wall seals.
      H. Conduit hubs.
   2. Boxes:
      A. Outlet boxes.
      B. Pull and junction boxes.

B. Related Sections:
   1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   2. Section 26 05 29 - Hangers and Supports for Electrical Systems.
   3. Section 26 05 53 - Identification for Electrical Systems.

1.02 REFERENCES

A. American National Standards Institute:
   1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
   2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

B. American Society for Testing and Materials (ASTM):
   1. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
   2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   3. ASTM A924/A924M – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
   4. ASTM D870 – Practice for Testing Water Resistance of Coatings Using Water Immersion
   5. ASTM D1151 – Standard Practice for Effect of Moisture and Temperature on Adhesive Bonds
   6. ASTM D3359 – Standard Test Methods for Measuring Adhesion by Tape Test

C. Federal Specifications (FS):

1. W-C-586 – Conduit Outlet Boxes, Bodies, and Entrance Caps, Electrical: Cast Metal
2. W-F-408 – Fittings for Conduit, Metal, Rigid (Thick-Wall and Thin-Wall (EMT) Type)
3. W-J-800 – Junction Boxes; Extension Box, Cover, Junction Box (Steel Cadmium, or Zinc Coated)
4. W-C-1094 – Schedule 80 PVC
5. WW-C-581 – Rigid Steel Conduit

D. National Electrical Contractors Association (NECA): Standard of Installation

E. National Electrical Manufacturers Association (NEMA):
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
5. NEMA RN 2 – Packing of Master Bundles for Steel Rigid Conduit, Intermediate Metal Conduit (IMC), and Electrical Metallic Tubing.
6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
8. NEMA WD 6 – Wiring Device Configurations.

F. National Fire Protection Association (NFPA):
1. NFPA 70 – National Electrical Code

G. Underwriters Laboratories (UL):
1. UL 1 – Flexible Metal Conduit
2. UL 6 – Rigid Metal Conduit
3. UL 94 – Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
4. UL 360 – Liquid Tight Flexible Steel Conduit
5. UL 514-B – Fittings for Conduit and Outlet Boxes
6. UL 651 – Standard for Safety for Schedule 40 and 80 Rigid PVC Conduit
7. UL 797 – Electrical Metallic Tubing
8. UL 1660 – Liquid-Tight Flexible Nonmetallic Conduit
9. UL 1684 – Reinforced thermosetting Resin Conduit (RTRC) and Fittings
10. Applicable Listings

1.03 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Underground More than 5 feet (1500 mm) outside Foundation Wall: Provide rigid steel conduit. Provide cast metal boxes or nonmetallic handholes. Thickwall non-metallic conduit encased in concrete may be used in place of rigid steel conduit sizes 2 inch (50 mm) or larger.

C. Underground Within 5 feet (1500 mm) from Foundation Wall: Provide rigid steel conduit. Provide cast metal or nonmetallic boxes.

D. In or Under Slab on Grade: Provide PVC conduit. Provide cast or nonmetallic boxes.

E. Outdoor Locations, Above Grade: Provide rigid steel conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes.

F. In Slab Above Grade: Provide PVC conduit. Provide cast or nonmetallic boxes.

G. Wet and Damp Locations: Provide rigid steel conduit. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet boxes in finished areas.

H. Concealed Dry Locations: Provide rigid steel conduit. Provide sheet-metal boxes. Provide flush mounting outlet boxes in finished areas. Provide hinged enclosure for large pull boxes.

I. Exposed Dry Locations: Provide rigid steel conduit. Provide sheet-metal boxes. Provide flush mounting outlet boxes in finished areas. Provide hinged enclosure for large pull boxes.

J. Corrosive Environments, such as digester gas handling, chlorine feeder and chlorine storage rooms: Provide PVC-coated rigid steel conduit. Provide stainless steel sheet metal boxes. Provide stainless steel supports and fasteners in accordance with Section 26 05 29.

1.04 DESIGN REQUIREMENTS

A. Raceway Size: ANSI/NFPA 70 as a minimum, larger where indicated.

B. Minimum Raceway Size: 3/4 inch (19 mm) unless otherwise specified.

C. Maximum Raceway Size in Slab Above Grade: 1-1/4 inch (30 mm); 1inch (25 mm) for conduits crossing each other.

D. Minimum Raceway Size for Underground Installation: 2 inch (50 mm).

E. Box Size:
1. ANSI/NFPA 70 as a minimum, larger where indicated.
2. Larger sizes or additional boxes may be installed to utilize standard sizes or to facilitate the installation.

1.05 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturer's catalog information for the following. Show dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories for each Product. Submit for the following:
   1. Metal conduit.
   2. Liquid-tight flexible metal conduit.
   3. Non-metallic conduit.
   4. Raceway fittings.
   5. Conduit bodies.
   6. Surface Metal Raceway
   7. Wireway.
   8. Outlet boxes.
   9. Pull and junction boxes.
   10. Expansion fittings.
   11. Wall seals.

C. Manufacturer's Installation Instructions:
   1. Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements.
   2. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.06 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures: Closeout procedures.

B. Project Record Documents:
   1. Record actual routing of conduits larger than 2 inch (50 mm) trade size.
   2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept conduit on site. Inspect for damage.

C. Protect raceway and boxes from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.09 PROJECT CONDITIONS

A. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Include installation within 10 feet (3 m) of location shown.

1.10 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate mounting heights, orientation, and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.01 METAL CONDUIT

A. Manufacturers:
1. Allied Tube & Conduit.
2. EGS/Appleton Electric.
3. Republic Conduit.
4. Wheatland Tube Company.
5. Substitutions: Section 01 60 00 - Product Requirements.

B. Rigid Steel Conduit:
1. Conforming to ANSI C80.1, FS WW-C-581 and UL 6.
2. Heavy wall full mild steel.
3. Threaded connections, hot dipped or electro-galvanized after cutting.
4. Outside surfaces, including threads and couplings, to be hot dipped or electro galvanized or sherardized, conform to UL 514-B.

C. Couplings, Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded, rigid steel fittings conforming to UL 6.

D. Finished rigid metal conduit to have a label affixed indicating compliance with UL Standard No. 6.

2.02 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Manufacturers:
1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.
3. Carlon Electrical Products
4. EGS/Appleton Electric.
5. Southwire Company.
6. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Interlocked steel construction with PVC jacket.

C. UL listed for use as equipment grounding conductor.

D. Connectors: Provide connectors with nylon insulated throats.

E. Fittings: ANSI/NEMA FB 1, as recommended by the manufacturer, UL approved for grounding.

2.03 NON-METALLIC CONDUIT

A. Manufacturers:
1. Heritage Plastics.
2. Prime Conduit.
3. National Pipe & Plastics.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: NEMA TC 2; Schedule 40 PVC and conforming to FS W-C-1094

C. UL 651 listed.

D. Fittings and Conduit Bodies: NEMA TC 3 as recommended by the conduit manufacturer.

2.04 SURFACE METAL RACEWAY

A. Manufacturers:
1. The Wiremold Co.
2. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

C. Finish: Buff enamel.

D. Fittings, Boxes, and Extension Rings: Furnish manufacturer’s standard accessories; finish to match raceway.

2.05 WIREWAY

A. Manufacturers:
1. Hubbell Wiring Devices.
2. Carlon Electrical Products.
3. Cooper B-Line, Inc.
4. Hoffman.
5. Panduit Corp.
6. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: General purpose, Oiltight and dust-tight, and Raintight wireway types.

C. Knockouts: Manufacturer's standard.

D. Size 4 x 4 inch (100 x 100 mm) or as indicated, length as indicated.

E. Cover: Hinged.

F. Connector: Slip-in.

G. Finish: Rust inhibiting primer coating with gray enamel finish.

2.06 OUTLET BOXES

A. Manufacturers:
1. Allied Moulded Products, Inc.
2. Carlon Electrical Products.
3. RACO; Hubbell.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel, conforming to FS W-J-800.
1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch (13 mm) male fixture studs where required.
2. Sheet Metal Outlet Boxes for Lighting Fixtures: Furnish octagonal boxes not less than 4 inches (100 mm).
3. Other sheet metal outlet boxes: Furnish square boxes not less than 4 inches (100 mm).
4. Covers: Of the same material and to fit the box.
5. Concrete Ceiling Boxes: Concrete type.
6. Multiple gangboxes: One piece construction.

C. Nonmetallic Outlet Boxes: NEMA OS 2.

D. Cast Metal Outlet Boxes: NEMA FB 1, Type FD, conforming to FS W-C-586.
1. Material Galvanized cast metal aluminum, ferroalloy or malleable iron.
2. Aluminum used for cast metal fittings to be copper free.
3. Depth: 2-1/2 inches (63 mm) minimum.
4. Furnish gasketed cover by box manufacturer. Cover of the same material designed to fit the box.
5. Furnish threaded hubs.
6. Include cover screws.

E. Cast metal boxes to be copper free aluminum alloy, free from blowholes, shrinkage cracks, cold-shuts, blisters, or other defects. Warped or defective boxes will not be accepted.

F. Boxes and covers to have machined joints. Drilling and tapping to be accurate. Provide clean cut, neoprene gaskets with boxes.

G. Cover Screws: Copper-silicon alloy for cast iron boxes, stainless steel for cast aluminum boxes.

H. Galvanizing: Cast iron boxes to be hot-dipped galvanized inside and outside. Surfaces to be smooth before galvanizing.

I. Hazardous (Classified) Areas: Provide boxes UL listed and marked for use in Class I locations.

2.07 PULL AND JUNCTION BOXES

A. Manufacturers:
1. Carlon Electrical Products.
2. Emerson Process Management.
3. Hoffman.
4. RACO; Hubbell.
5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Cast metal or sheet steel as specified or indicated. Furnish covers to fit boxes of the same material.

C. Sheet Metal Boxes:
1. NEMA OS 1, galvanized steel.
2. Minimum Metal Thickness:
A. Boxes less than 100 cu in (2.8 cu m): Not less than 14 ga (1.8 mm).
B. Boxes 100to 1,800 cu in (2.8 to 51 cu m): Not less than 12 ga (2.5 mm).
C. Boxes larger than 1,800 cu in (51 cu m): Not less than 10 ga (3.3 mm).
3. Furnish a framework of structural steel members sized to provide a rigid and substantial box for boxes 3 x 3 x 1-1/2 ft (900 x 900 x 460 mm) and larger in any dimension unless otherwise approved by Engineer. Weld, bolt, or rivet structural steel members together with sheet steel.
4. Furnish removable covers of the same gauge steel as the boxes, or heavier if required to prevent bulging or warping.
5. Attached covers with copper silicon screws. Furnish two cast or pressed steel handles for covers heavier than 20 lbs (9 kg). Boxes and covers to be hot dipped galvanized inside and outside after fabrication.

D. Surface-Mounted Cast Metal Box: NEMA 250, as required for installation; flat-flanged, surface-mounted junction box.
1. Material: Galvanized cast iron.
2. Cover: Same material as box. Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
3. Cast metal boxes to be free from blowholes, shrinkage cracks, cold-shuts, blisters, or other defects, and to have machined joints.

2.08 CONDUIT FITTINGS

A. Manufacturers:
1. Appleton Electric.
2. Crouse-Hinds.
3. O-Z/Gedney.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Galvanized cast metal or malleable iron conduit fittings conform to FS W-C-586. Aluminum used for cast metal fittings to be copper free. Cast metal or malleable iron outlet boxes to be at least 2-1/2 inches (63 mm) deep. Covers for fittings and outlet boxes to be of the same material, designed to fit the box or fitting, and complete with gaskets.

C. Conduit couplings, elbows, and nipples to match specifications for the conduit.

D. Locknuts, bushings, reducers, and similar conduit fittings to be galvanized, conforming to FS W-F-408.

E. Insulating Bushings: Furnish malleable iron or steel insulating bushings with plastic inserts, or all plastic, high impact resistant type. Provide insulting bushings with UL temperature rating of 150 C and equipped with ground lugs where required.

2.09 EXPANSION FITTINGS

A. Rigid Metal Expansion Couplings:
1. Manufacturers:
   A. O-Z/Gedney Co. Type EX
   B. Crouse-Hinds Type XJ
   C. Appleton Electric
   D. Substitutions: per Section 01 60 00 – Material and Equipment
2. Product Description: Expansion fittings with external bonding jumpers for ground continuity.
3. Expansion couplings to provide 8 inch (200 mm) movement.
4. Where installed with PVC coated conduit, provide PVC coated expansion couplings matching characteristics of the conduit.

B. Deflection and Expansion Couplings:
1. Manufacturers:
   A. O-Z/Gedney
   B. Crouse-Hinds
   C. Appleton Electric
   D. Substitutions: per Section 01 60 00 – Material and Equipment
2. Product Description: Expansion deflection type consisting of molded neoprene sleeves with bonding jumpers passing through separate waterproof compartments, and two silicon bronze couplings.
3. Permit a ¾ inch (19 mm) expansion and contraction and a ¾ inch (19 mm) deflection without deformation.

2.10 WALL SEALS

A. Manufacturers:
1. O-Z/Gendy
2. Substitutions: per Section 01 60 00 – Material and Equipment

B. Product Description: Wall seals having sealing assemblies on both sides of walls, and each body size to accept several different size sealing assemblies.

C. Seal sleeves: PVC oversize for conduit through 4 inch (100 mm) and steel for larger sizes.

D. Casting Material: Malleable iron with hot dipped galvanized finish.

E. Furnish oversize sleeve, sealing ring between seal body and membrane clamp.

2.11 CONDUIT HUBS

A. Conduit hubs not integral with a box or fitting to be malleable iron or stainless steel with nylon insulated throats. Provide hubs with positive grounding and equipped with O-rings of neoprene for a watertight installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify surfaces are ready to receive Work.

C. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

D. Verify outlet boxes are installed at proper height.

E. Verify that field measurements are as shown on Drawings.

F. Verify routing, mounting and termination locations prior to rough-in.

G. Wireway and raceway locations shown on Drawings are approximate unless dimensioned. Install raceway as required to complete wiring system.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surfaces.

3.03 INSTALLATION

A. Install raceway and boxes in accordance with NECA “Standard of Installation”.

B. Install Products in accordance with manufacturer’s instruction.

C. Ground and bond raceway and boxes in accordance with Section 26 05 26 - Grounding and Bonding for Electrical Systems.

D. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29 - Hangers and Supports for Electrical Systems.

E. Identify raceway and boxes in accordance with Section 26 05 53 - Identification for Electrical Systems.

F. Install sleeves and fireproofing in accordance with Section 26 05 29 – Hangers and Supports for Electrical Systems.

G. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.04 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Install raceways concealed in floors, walls, ceilings, or underground, unless otherwise indicated or approved by Engineer.

C. Increase conduit size shown on the plan to meet NFPA 70 conduit fill requirements for the conductors installed.

D. Non-Metallic Conduit:
1. Install non-metallic conduit in accordance with manufacturer's instructions.
2. Join non-metallic conduit using cement as recommended by manufacturer.
3. Wipe non-metallic conduit dry and clean before joining.
4. Apply full even coat of cement to entire area inserted in fitting.
5. Allow joint to cure for 20 minutes, minimum.

E. Conduit Installed in Concrete:
1. Do not embed electrical metallic tubing in concrete.
2. Concrete-tight split couplings may be used in raceways embedded in concrete instead of union type couplings. After installation and before concrete is poured, demonstrate to Engineer that the installation has low resistance.
3. Space and support raceways concealed in concrete so that they will not affect the structural strength or watertightness of the concrete.
4. Place raceway in the approximate center of slabs, wall, and footings. Install raceways to insure no contact with reinforcing steel.
5. Raceway that cannot be installed in the slab to be encased in concrete beneath the slab.
6. Support the raceway to maintain location and spacing during concreting operations.
7. Protect raceways in ground beneath slabs on grade on all sides by concrete not less than 3 inches (75 mm) thick. Extend structural expansion joints through raceway encasement.

F. Raceway Routing:
1. Route exposed raceway parallel and perpendicular to walls.
2. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
3. Make changes in direction of exposed conduit runs with symmetrical bends or cast metal conduit boxes.
4. Route conduit in and under slab from point-to-point.

5. Maintain clearance between raceway and piping for maintenance purposes.
6. Maintain 12 inches (300 mm) clearance between raceway and surfaces with temperatures exceeding 104 degrees F (40 degrees C).

G. Raceway installed through existing walls and floors:
1. Allow three core diameters center to center between cored holes, with a minimum of 2 inches (50 mm) clear between cores.
2. Do not core holes through beams.
3. All coring holes to be approved by the Engineer.

H. Raceway Support:
1. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
2. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports.
3. Arrange raceway supports to prevent misalignment during wiring installation.
4. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceway.
5. Do not attach raceway conduit to ceiling support wires or other piping systems.

I. Threading:
1. Make up threaded raceway joints with a conductive compound applied to male threads only to insure low resistance to ground continuity.
2. Do not use running threads.
3. Cut conduit square using saw or pipe cutter; de-burr cut ends.

J. Provide reducers as required to connect conduit to equipment.

K. Surface Raceway and Wireway:
1. Install flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.
2. Supports: Construct wireway supports from steel channel specified in Section 26 05 29.
3. Install insulating bushings and inserts at connections to outlet and corner fittings.
4. Close ends and unused openings in wireway.

L. Provide wall seals for raceways passing through exterior walls of structures below grade, except at electrical manholes.

M. Bring conduit to shoulder of fittings; fasten securely.

N. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

O. Bends:
1. Make raceway bends to have a radius as long as possible.

2. Do not use short radius bends unless approved by Engineer.
3. Make field bends with approved hickeys or conduit bending machines.
4. For raceway containing fiber optic cable do not make bends shorter than 20 times the diameter of the fiber optic cable.
5. Install no more than equivalent of three 90 degree bends (270 degrees total) between pull points. Install conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.

P. If possible, slope raceways to drain to the nearest box or fitting. If not possible, provide other means for draining entrapped water.

Q. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

R. Protect the conduit when mortar or other deleterious material used in the vicinity.

S. Install suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints.
1. Install rigid metallic expansion couplings for exposed conduit.
2. Install deflection and expansion couplings for embedded conduit.

T. Install pull string or cord in each empty conduit except sleeves and nipples.

U. Install caps to protect installed conduit against entrance of dirt and moisture.

3.05 INSTALLATION - BOXES

A. Size boxes to conform with NEC requirements, install larger boxes where indicated or to facility cable installation.

B. Install electrical boxes in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

C. Unless otherwise indicated, install cast metal or malleable iron outlet, junction, and pull boxes for boxes less than 1,800 cu in (51 cu m):
1. Below grade floor elevation of structures, except fixture outlet boxes in ceilings.
2. Exposed less than 7 ft (2 m) above the finished floor on floors above grade within a structure.
3. Exposed to the weather including those installed flush with the outside surface of exterior walls. These boxes shall be NEMA 4.240

D. Install cast outlet box in exterior locations, below grade within a structure and wet locations.

E. Install wall mounted boxes at elevations to accommodate mounting heights as **s**pecified in section for outlet device.

F. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet (3 m) prior to rough-in to accommodate intended purpose.

G. Orient boxes to accommodate wiring devices.

H. Install drainage openings in the bottom and vent openings in the bottom or sides of junction and pull boxes which receive conduit drainage.

I. Install surface junction and pull boxes with a ½ in (12 mm) clearance between the box and the surface. Spacers shall be 1 x ½ x 1/8 in (25 x 12 x 3 mm) bar channels. Wood spacers shall not be installed.

J. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

K. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.

L. Locate outlet boxes to allow luminaires positioned as shown.

M. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

N. Install only one device in a single gang position. Flush boxes shall have trim, where required, to cover irregularities in masonry, concrete, and plaster.

O. Install pull boxes and junction boxes above accessible and in unfinished areas only.

P. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

Q. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches (150 mm) separation. Install with minimum 24 inches (600 mm) separation in acoustic rated walls.

R. Locknuts, bushings, reducers and similar conduit fittings shall be galvanized.

S. Install adjustable steel channel fasteners for hung ceiling outlet box.

T. Do not fasten boxes to ceiling support wires or other piping systems.

U. Support boxes independently of conduit.

V. Install gang box where more than one device is mounted together. Do not use sectional box.

W. Install gang box with plaster ring for single device outlets.

X. Large Pull Boxes: Boxes larger than 100 cubic inches (1,600 cubic centimeters) in volume or 12 inches 9300 mm) in any dimension.
   1. Interior Dry Locations: Use hinged enclosure.
   2. Other Locations: Use surface-mounted cast metal box.
   3. Covers: To be attached with stainless steel screws. Furnish two cast or pressed steel handles on covers heavier

Y. Provide conduit hubs to terminate conduits at cast metal or malleable iron boxes which do not have integral hubs, and at steel enclosures or boxes located below grade floor elevation in structures.

Z. Provide plates and covers on outlet boxes which do not have attached lighting fixtures.

3.06 INTERFACE WITH OTHER PRODUCTS

A. Route conduit through roof openings for piping and ductwork or through suitable roof penetrations approved by the roofing manufacturer. Coordinate location with roofing installation.

B. Locate outlet boxes to allow luminaires positioned as shown on Drawings or reflected ceiling plan.

C. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

D. Install explosion-proof sealing fittings at each penetration to classified areas.

E. Install Type CGS sealing fitting in each conduit enclosing pump feeder and control cables.

F. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights specified and indicated on Drawings.

G. Provide liquid tight flexible metal conduit no more than 3-feet (900 mm) long to connect motors, limit switches, solenoid valves, and other devices where vibration is possible and flexibility is desired. Fittings shall be approved for the purpose and, where required, shall include a method for terminating the bonding and grounding conductor, or a grounding conductor shall be installed in the raceways.

H. Provide insulting bushings with grounding lugs on conduits terminating under medium voltage equipment, motor control centers, control panels, and similar equipment. Bond to equipment and system ground.

I. Conduit hubs not integral with a box or fitting shall be malleable iron or stainless steel with nylon insulated throats. Hubs shall have positive grounding and shall be equipped with O-rings of neoprene for watertight installation.

J. Until conductors are pulled, the ends of raceways shall be plugged with tapered plugs or capped bushings. Clean raceways with a dry swab before pulling conductors. Clogged raceways shall be freed of obstructions or be replaced.

K. Fasten raceways to sheet metal boxes, cabinets, panels, and similar devices with two locknuts where required by the NEC, where insulating bushings are used, or where bushings cannot be brought into firm contact with the boxes. Provide bushings on the ends of raceways, unless the conduit fittings are insulated throat types. Bushings shall be insulating type where required by the NEC.

L. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with Section 07 84 00 - Firestopping.

M. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

3.07 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01 45 00.

B. Verify grounding continuity of each conduit.

C. Inspect each wiring device for defects.

D. Verify wiring connections of each wiring device.

3.08 ADJUSTING

A. Section 01 77 00 - Closeout Procedures: Testing, adjusting, and balancing.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused openings in boxes.

3.09 CLEANING

A. Section 01 77 00 - Closeout Procedures: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Nameplates.
2. Labels.
3. Wire and cable markers.
4. Conduit/Raceway markers.
5. Lockout Devices.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. National Contractors Associations (NECA):
1. NECA Standard of Installation

C. National Electrical Manufacturers Association (NEMA):
1. NEMA 250 – Enclosures for Electrical Equipment (1,000 Volts Maximum)

D. National Fire Protection Association (NFPA):
1. NFPA 70 – National Electrical Code

E. International Electrical Testing Association (NETA):
1. ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

F. Underwriters Laboratories (UL): Applicable listings

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
1. Submit manufacturer’s catalog literature for each product required.
2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.04 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures: Requirements for submittals.

B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

C. Identify local spare part sources for future maintenance or additions.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

2.01 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved black letters on white background.

B. Letter Size:
1. 3/16 inch (4.8 mm) high letters for identifying individual equipment and loads.
2. ¼ inch (6 mm) high letters for identifying grouped equipment and loads.

C. Minimum nameplate thickness: 1/8 inch (3 mm). Front edge: 1/32 inch (.8 mm).

D. Nameplate Fabrication:
1. Material: Laminated phenolic
2. Inner layer: Black
3. Outer layer: White
4. Polished surface on both sides

5. Engraved inscription: Black letters on white background

2.02 LABELS

A. Labels: Embossed adhesive tape, with 3/16 inch (5 mm) black letters on white background.

2.03 WIRE MARKERS

A. Manufacturers:
1. Thomas & Betts Company
2. Brady ID.
3. Substitutions: Section 01 60 00 - Product Requirements

B. Description: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted number and letters.

C. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.
2. Control Circuits: Control wire number as indicated on schematic and interconnection diagrams or shop drawings.

2.04 CONDUIT AND RACEWAY MARKERS

A. Manufacturers:
1. Panduit Corporation, Pan-Steel.
2. Substitutions: Section 01 60 00 - Product Requirements

B. Product Description: Embossed stainless-steel marker plates to provide permanent identification with type MLT-H ties.

2.05 LOCKOUT DEVICES

A. Lockout Hasps:
1. Anodized aluminum hasp with erasable label surface; size minimum 7-¼ x 3 inches (184 x 75 mm).

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.

3.02 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.03 INSTALLATION

A. Section 01 45 00 – Quality Control: Manufacturer’s instructions.

B. Install nameplates and labels in accordance with manufacturer's instructions to maintain the NEMA rating of the equipment enclosure.

C. Install identifying devices after completion of painting.

D. Nameplate Installation:
   1. Install nameplate parallel to equipment lines.
   2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
   3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
   4. Secure nameplate to equipment front using stainless steel screws or rivets.
   5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
   6. For explosion-proof equipment secure nameplate to equipment using suitable adhesive.
   7. Install nameplates for the following:
      a. Electrical distribution and control equipment enclosures
      b. Communications cabinets
      c. Motor control center cubicles
      d. Starters, contactors, safety switches and circuit breaker enclosures
      e. Instruments and transmitters
      f. As specified under the equipment specifications

E. Label Installation:
   1. Install label parallel to equipment lines.
   2. Install labels for permanent adhesion and seal with clear lacquer.

F. Wire Marker Installation:
   1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
   2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
   3. Install labels at data outlets identifying patch panel and port designation.

G. Conduit Marker Installation:
   1. Install conduit marker for each conduit longer than 6 feet (2000 mm).
   2. Conduit Marker Spacing: 20 feet (6000 mm) on center.
   3. Fasten marker tags to raceway and conduit with heavy cross section stainless steel tags.

END OF SECTION

SECTION 26 29 23

VARIABLE-FREQUENCY DRIVES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes variable frequency drives in standalone cabinets. **NOTE:** VFDs for use on this project will be supplied by the Owner (see Attachment to these specifications for information on the VFDs). Contractor will move VFDs from existing storage location into new locations.

B. Related Sections:
1. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
2. Section 26 05 29 – Hangers and Supports for Electrical Systems.
3. Section 26 05 53 – Identification for Electrical Systems.

1.02 REFERENCES

A. Institute of Electrical and Electronics Engineers:
1. ANSI/IEEE 519 – IEEE Guide for Harmonic Control and Reactive Compensation of Static Power Converters.
2. ANSI/IEEE 597 – IEEE Practices and Requirements for General Purpose Thyristor DC Drives.
3. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FU 1 - Low Voltage Cartridge Fuses.
3. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives.
4. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems.

C. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association (NFPA):
1. NFPA 70 – National Electrical Code.

E. Underwriters Laboratories (UL):
1. UL 508C – Standard for Safety for Power Conversion Equipment.
2. Applicable Listings.

1.03 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings:
1. Front and side views of enclosures including the harmonic filters.
2. Show mounting, installation and support details of the controller including the harmonic filters.
3. Show overall dimensions and weights.
4. Show conduit entrance locations and requirements.
5. Electrical characteristics including voltage and maximum input current.
6. Heat loss from the controller in Btu per hour.
7. Component product data.
8. Component layout drawings.
9. Complete wiring diagram.
10. Nameplate legends.

C. Product Data: Submit catalog sheets showing the following information:
1. Detailed response to this specification showing where in the literature each requirement is satisfied.
2. All clarifications and exceptions must be clearly identified.
3. Voltage.
4. Controller size.
5. Ratings and size of switching and overcurrent protective devices (circuit breaker disconnect in separate section).
6. Short circuit ratings.
7. Dimensions.
8. Enclosure details.

D. Harmonic Analysis: Submit calculations to Engineer confirming compliance with the recommended practices described in ANSI/IEEE 519 prior to release from manufacturer.

E. Test Reports:
1. Indicate field test and inspection procedures and test results.
2. Submit print out from harmonic analyzer connected at the input of the drive under load at the drive speed corresponding to the speed having the highest harmonic content.

F. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

G. Manufacturer shall supply a list of parameters required to be programmed by the Drive Field Service Start-up Tech. The contractor shall submit for review in writing the settings for these various parameters and the motor nameplate details including full load current.

H. Manufacturer's Certification: Submit a signed statement from manufacturer's representative and addressed to Owner that the equipment has been properly installed and is in good working order.

I. Manufacturer's Field Reports:
1. Indicate start-up inspection findings.
2. Indicate acceptance of installation.

1.04 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures: Closeout procedures.

B. Project record documents: Accurately record actual installed equipment.

C. Operation Data:
1. Submit instructions complying with NEMA ICS 7.1.
2. Include procedures for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions.

D. Maintenance Data:
1. Submit instructions complying with NEMA ICS 7.1.
2. Drive Parameter Listing.
3. Field Service Report from Drive Start-up Service.
4. Include routine preventative maintenance schedule.
5. Include trouble shooting and repair procedures.
6. Identify system maintenance requirements, servicing cycles, lubrication types required and local spare parts sources. Include name and phone number for a local distributor for the spare parts.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of project.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Products:
1. Listed and classified by Underwriters Laboratories, Inc.
2. Constructed to Underwriters Laboratories, Inc. Standard 508 and bear the label "ENCLOSED INDUSTRIAL CONTROL PANEL".

1.07 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept controllers on site in original packing. Inspect for damage.

C. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.

D. During storage contractor shall connect internal space heaters with temporary power.

E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.

1.08 PROJECT CONDITIONS

A. Verify field measurements are as shown on Drawings.

B. Verify locations of equipment prior to rough-in.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on show drawings.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Conform to NEMA ICS 7 service conditions during and after installation of variable frequency controllers.

1.11 WARRANTY

A. Section 01 77 00 - Closeout Procedures: Product warranties and product bonds.

1.12 MAINTENANCE SERVICE

A. Section 01 77 00 - Closeout Procedures: Maintenance service.

1.13 MAINTENANCE MATERIALS

A. Section 01 77 00 - Closeout Procedures: Spare parts and maintenance products.

PART 2 PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A. Manufacturers:
1. Siemens.

B. Product Description: NEMA ICS 7, enclosed variable frequency drive suitable for operating indicated loads. Select unspecified features and options in accordance with NEMA ICS 7.1. Standalone cabinets shall be NEMA 1.

C. Ratings:
1. Rated Input Voltage: 480 volts, three phase, 60 Hertz.

2. Motor Nameplate Voltage: 460 volts, three phase, 60 Hertz.
3. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
4. Operating Ambient: 0 degrees C to 40 degrees C.
5. Minimum Efficiency at Full Load: 96% percent.
6. Output Voltage shall be adjustable from 0 to rated motor voltage.
7. Operating Frequency range shall be from 0-120 Hz.

D. Design Features:
1. Employ microprocessor-based inverter logic isolated from power circuits.
2. Employ pulse-width-modulated inverter system.
3. Design for ability to operate controller with motor disconnected from output.
4. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
5. Design to include running and starting output short circuit protection for line to line and line to ground faults.

E. Hardware
1. Utilize diode or fully gated bridge on the input.
2. Utilize line reactor on all ratings. Harmonic Filter encompasses line reactor.
3. Utilize switching logic power supply operating from the DC bus.
4. Incorporate phase to phase and phase to ground MOV protection.
5. Utilize gold plated plug-in connections on printed circuit boards.
6. Microprocessor based inverter logic shall be isolated from power circuits.
7. Utilize latest generation inverter section.
8. Inverter section shall not require commutation capacitors.
9. Employ operator interface common for all horsepower ratings. Interface shall include a LCD digital display, programming keypad and operator key options.
10. Main Control Board shall be common for all ratings.
11. Control connection shall be common for all ratings.
12. Common Node Capacitors available on all frames.

F. Control Logic:
1. Ability to operate a drive with motor disconnected.
2. Provide a controlled shut down, when properly fused, with no component failure in the event of an output phase to phase or phase to ground short circuit. Provide annunciation of the fault condition.
3. Utilize an adjustable PWM carrier frequency within a range of 1-6kHz.
4. Provide either Selectable Sensorless Vector or V/Hz modes.
5. The drive shall be suitable for use on either normal duty or heavy-duty loads. If specified for normal duty, the drive shall provide 110 percent overload capability for up to one minute and 150 percent overload capability for up to three seconds. If specified for heavy duty, the drive shall provide 150 percent overload capability for up to one minute and 180 percent overload capability for up to three seconds.

6. Provide multiple programmable stop modes including – Ramp, Coast, DC-Brake, Ramp-to-Hold and S-Curve.
7. Provide multiple acceleration and deceleration rates.
8. All adjustments shall be made with the door closed.
9. The drive shall have an adjustable output frequency up to 320 Hz.
10. Design to ride through dips in the controller supply voltage.
11. Design to store all programmable settings such as minimum speed, maximum speed, volts/Hz, etc. in non-volatile memory not affected by power outages.
12. Design to meet maximum harmonic current distortion in Table 10.3 of ANSI/IEEE 519.
13. Design to meet maximum harmonic voltage distortion in Table 11.2 of ANSI/IEEE 519.
14. Each VFD shall have an integral single loop controller suitable for control of the VFD.
15. Refer to Schematics for integral control logic required. Unless otherwise noted, control logic shall be integral to the VFD to all for Manual or Local Automatic operation without the SCADA system.
16. The VFD shall communicate with the RTU via hardwired I/O points.
17. UL 508A Panel recognition program.

2.02 PRODUCT OPTIONS AND FEATURES

A. Control Mode:
1. Selectable sensorless vector or V/Hz mode selectable through programming.
2. The sensorless vector mode shall use motor nameplate data plus motor operating data such as IR drop, nominal current and flux up time.
3. The volts per hertz mode shall be programmable for pre-programmed fan curve, straight line or full custom patterns.

B. Current Limit:
1. Programmable current limit from 0.1 amps to 150% of drive rated amps.
2. Current limit shall be active for all drive states, accelerating, constant speed and decelerating.
3. The drive shall employ PE regulation with an adjustable gain for smooth transition in and out of current limit.

C. Acceleration / Deceleration:
1. Acceleration/Deceleration settings shall provide separate adjustments to allow either setting to be adjusted from 0 seconds to 3600 seconds.
2. A second set of remotely selectable Acceleration/Deceleration settings shall be accessible through digital inputs.

D. Speed Regulation Modes:
1. Open Loop.
2. Slip Compensation with speed regulation from 0.1 to 0.5 percent.
3. Process PI control.

E. Speed Profiles:

1. Programming capability shall allow the user to produce speed profiles with linear acceleration/deceleration or “S-Curve” profiles that provide changing acceleration/deceleration rates.
2. S-Curve profiles shall be adjustable.

F. Adjustments:
1. A digital interface shall be used for all set-up, operation and adjustment settings.
2. All adjustment shall be stored in nonvolatile memory (EEPROM).
3. No potentiometer adjustments shall be required.
4. The drive shall provide EEPROM memory for factory default values.

G. Process PI Control:
1. The drive shall incorporate an internal process PI regulator with proportional and integral gain adjustments as well as error inversion and output clamping functions.
2. The feedback shall be configurable for normal or square root functions. If the feedback indicates that the process is moving away from the setpoint, the regulator shall adjust the drive output until the feedback equals the reference.
3. Process control shall be capable of being enabled or disabled with a hardwire input. Transitioning in and out of process control shall be capable of being tuned for faster response by preloading the integrator.
4. Protection shall be provided for a loss of feedback or reference signal.

H. Fault Reset / Run:
1. The drive shall provide up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart.
2. The automatic mode shall not applicable to a ground fault, shorted output faults or other internal microprocessor faults.
3. The time between restarts shall be adjustable from 0.5 seconds to 30 seconds.

I. Skip Frequencies:
1. Three adjustable set points that lock out continuous operation at frequencies which may produce mechanical resonance shall be provided.
2. The set points shall have a bandwidth adjustable from 0 Hz to 60 Hz.

J. Run on Power Up:
1. A user programmable restart function shall be provided to automatically restart the equipment after restoration of power after an outage.

K. Inertial Ride Through:
1. The drive shall respond to a loss of AC input power by adjusting the output frequency to create a regenerative situation in the motor.
2. The regenerated energy shall recapture the mechanical energy and convert it to electrical energy that shall power the drive logic during the power outage.
3. The drive shall retain control of the motor during the power outage.

4. The performance shall be based upon the amount of system inertia and the length of the outage.
5. The amount of voltage drop required to trigger inertia ride through and the level at which regulation occurs shall be adjustable.
6. Inertial Ride Through shall be capable of being enabled or disabled via programming.

L. Fault Memory:
1. The last eight (8) fault codes with respective time shall be stored in a fault buffer.
2. Information about the drive's condition at the time of the last fault such as operating frequency, output current, DC bus voltage and twenty-eight other status conditions shall be stored.
3. A power up marker shall be provided at each power up time to aid in analyzing fault data.
4. The last eight (8) alarm codes shall be stored, without time stamp, for additional troubleshooting reference.

M. Overload Protection:
1. The drive shall provide internal Class 10 motor overload protection investigated by UL to comply with NEC Article 430.
2. Overload protection shall be speed sensitive and adjustable.
3. A viewable parameter shall store the overload usage.

N. Auto Economizer:
1. An auto economizer feature shall be available to automatically reduce the output power voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage shall be reduced to minimize flux current in a lightly loaded motor thus reducing kW usage.
2. When the load increases, the drive shall automatically return to normal operation.

O. Terminal Blocks:
1. Separate terminal blocks shall be provided for control and power wiring.

P. Flying Start:
1. The drive shall be capable of determining the speed and direction of a spinning motor and adjust its output to "pick-up" the motor at the rotating speed.

Q. Ride Through:
1. The control logic shall be capable of "riding through" a power outage of up to 2 seconds in duration.

R. Inputs and Outputs:
1. The standard Input / Output board shall consist of both analog and digital I/O.
2. No jumpers or switches shall be required to configure inputs and outputs. All functions shall be fully programmable.

3. The Input / Output board shall have the following analog inputs as minimum. Furnish all I/O required by the Contract Documents.
   a. Quantity one (1) differentially isolated plus or minus 10V (bi-polar) / 20mA, 9 bit plus sign, 10V common mode noise rejection.
   b. Quantity one (1) differentially isolated plus or minus 10 V (bi-polar) / 20 mA, 9 bit plus sign, 160V common mode noise rejection.
   c. Analog inputs shall be user programmable for a variety of uses including frequency command and process loop input. Analog inputs shall be user programmable for function scaling (including invert), offset, signal loss detect and square root.
4. The Input / Output board shall have the following analog outputs as a minimum. Furnish all I/O required by the Contract Documents.
   a. Quantity one (1) differentially isolated plus or minus 10V (bi-polar) / 20mA, 9 bit plus sign.
   b. The analog output shall be user programmable to be proportional to one of fourteen process parameters including output frequency, output current, encoder feedback, output power.
   c. Programming shall be available to select either absolute or signed values of these parameters.
5. The Input / Output board shall have the following digital inputs as minimum. Furnish all I/O required by the Contract Documents.
   a. Quantity of six (6) digital inputs rated 115Vac.
   b. All inputs shall be individually programmable for functions from a list of thirty-one (31) that includes Start, Run, Stop, External Fault, Speed Select, Jog and Process PI function.
6. The Input / Output board shall have the following digital outputs as minimum. Furnish all I/O required by the Contract Document.
   a. Quantity of two (2) relay outputs, from C (1 N.O. – 1 N.C.).
   b. Contact output ratings shall be 115Vac.
   c. Relays shall be programmable to twenty-eight (28) different conditions including Fault, Alarm, At Speed, Drive Ready and PI Excess Error.
   d. Timers shall be available for each output to control the amount of time, after the occurring even, that the output relay actually changes state.

S. Reference Signals:
1. The drive shall be capable of using the following input reference signals:
   a. Analog inputs.
   b. Preset speeds.
   c. Remote potentiometer.
   d. Digital MOP.
   e. Human Interface.
   f. Communication module commands.

T. Loss of Reference:
1. The drive shall be capable of sensing the following reference loss conditions.

2. In the event of loss of the reference signal, the drive shall be user programmable to the following:
    a. Fault the drive.
    b. Alarm and maintain last reference.
    c. Alarm and go to preset speed.
    d. Alarm and go to minimum speed.
    e. Alarm and go to maximum speed.
    f. Alarm and maintain last output frequency.

U. Metering:
1. The following parameters shall be accessible through the Human Interface:
    a. Output Current in Amps.
    b. Output Voltage in Volts.
    c. Output Power in kW.
    d. Elapsed MWh.
    e. DC Bus Voltage.
    f. Output Frequency.
    g. Last eight (8) Faults.
    h. Elapsed Run Time.

V. Faults:
1. Fault information shall be accessible through the Human Interface.
2. At a minimum the following faults shall be displayed:
    a. Power Loss.
    b. Undervoltage.
    c. Overvoltage.
    d. Motor Overload.
    e. Heat Sink Over-Temperature.
    f. Maximum Retries.
    g. Phase to Phase and Phase to Ground Faults.

W. Remote Status Indication: Furnish terminals for the following remote status minimum. Furnish all I/O required by the Contract Documents:
1. Dry contact for controller “RUN” indication.
2. Additional “HAND-OFF-AUTO” selector switch contact block for “AUTO” switch position indication.
3. Start/Stop and Reset Pushbuttons.
4. Speed Control.
5. Isolated 4-20 mA DC signal for motor speed indication.
6. Isolated contact for remote controller “FAIL” indication.
7. I/O as indicated on Contract Drawings.

X. Indicators and Manual Controls:
1. Input Signal: 4 - 20 mA DC.
2. Display: Furnish integral digital display to indicate output voltage, output frequency, and output current.
3. Status Indicators: Separate indicators for overcurrent, overvoltage, ground fault, overtemperature, and input power ON.
4. Volts Per Hertz Adjustment: Plus or minus 10 percent.
5. Current Limit Adjustment: 60 - 110 percent of rated.

6. Acceleration Rate Adjustment: 0.5 - 30 seconds.
7. Deceleration Rate Adjustment: 1 - 30 seconds.
8. HAND-OFF-AUTO selector switch with bumpless transfer and manual speed control.
9. Manual Start and Stop pushbuttons and manual speed control.
10. Control Power Source: Integral control transformer.

Y. Safeties and Interlocks:
1. Include undervoltage release.
2. Door Interlocks: Mechanical means to prevent opening of equipment with power connected, or to disconnect power when door is opened; include means for defeating interlock by qualified persons.
3. Safety Interlocks: Terminals for remote contact to inhibit starting under both manual and automatic mode.
4. Control Interlocks:
   a. Furnish terminals for remote contact to allow starting in automatic mode.
   b. Furnish terminals to accept controller shutdown signal from the following: motor temperature; motor bearing temperature; motor vibration switch; pump temperature; pump vibration switch; and pump bearing temperature. Indicate shutdown signal status.
5. Emergency Stop: Use dynamic brakes for emergency stop function.
6. Disconnecting Means: Integral circuit breaker on line side of each controller. Provide external operator with provisions for padlocking in the OFF position.
7. Receive and install pump/motor protection devices furnished by pump/motor manufacturer.

Z. Fabrication:
1. Wiring Terminations: Match conductor materials and sizes as indicated on Drawings.
2. Enclosure: NEMA 250, Type 1, suitable for equipment application.
3. Finish: Manufacturer's standard enamel.

2.03 TRANSIENT VOLTAGE SUPPRESSION DEVICES

A. Manufacturers:
1. Allen-Bradley
2. Eaton Cutler-Hammer
3. Schneider Electric/Square D
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: IEEE C62.41, factory-mounted transient voltage surge suppressor, selected to meet requirements for medium exposure and to coordinate with system circuit voltage.

2.04 UNIVERSAL HARMONIC FILTER

A. Manufacturers:
1. TCI
2. MTE

3. Mirus
4. Substitutions: Not Permitted. The Variable Frequency Drive manufacturer as specified herein shall provide the Variable Frequency Drive and UHF as a complete working system.

B. The harmonic mitigation equipment shall treat all the characteristics low frequency harmonics generated by a 3-phase, diode bridge load (5^{th}, 7^{th}, 11^{th}, 13^{th}, etc.).

C. The characteristic harmonics shall be suppressed without the need for individual tuning or the requirement to phase shift against other harmonic sources.

D. Harmonic mitigation shall be by passive inductor/capacitor network. Active electronic components shall not be used.

E. Power factor shall be 0.98 lagging to 0.95 leading in operating range from full to half load.

F. To ensure compatibility with engine generators, the harmonic mitigation equipment must never introduce a capacitive reactive power (KVAR) which is greater than 15 percent of its kVA rating.

G. The harmonic mitigation equipment shall not resonate with system impedances or attract harmonic currents from other harmonic sources.

H. The harmonic mitigation equipment in combination with the Variable Frequency Controller shall meet all requirements outlined in the 1992 edition of IEEE std 519 for individual and total harmonic voltage and current distortion. The Point of Common Coupling (PCC) for all voltage and current harmonic calculations and measurements shall be the input terminals to the harmonic mitigation equipment.

I. Total Harmonic Voltage Distortion (THVD) shall meet the requirements of Table 10.2 of IEEE std 519 by not exceeding 5 percent and by limiting the individual harmonic voltage distortion to less than 3 percent. These limits shall apply while operating on either utility supply or generator supply when applicable. The harmonic mitigation equipment vendor shall not be responsible for pre-existing voltage distortion caused by other harmonic sources.

J. Total Demand Distortion (TDD) of the current at the input terminals of the harmonic mitigation equipment shall not exceed the limits as defined in Table 10.3 of IEEE Std 519. For lsc/IL ratio <20, TDD must be less than 5 percent. For all other lsc/IL ratios, the TDD must not exceed 8 percent event when Table 10.3 allows for more relaxed limits.

K. The full load efficiency of the harmonic mitigation equipment / VFD combination shall be greater than 96 percent. The harmonic mitigation equipment itself shall have efficiency no less than 99 percent.

L. The VFC DC Bus voltage level and ripple shall be kept within manufacturers acceptable tolerances with input voltage ranging from +10 percent to –15 percent of nominal.

M. All wiring shall be copper.

N. Insulation Class: 220 degrees C system. Temperature rise: 130 degrees C.

O. Anti-vibration pads shall be used between the reactor or transformer core and the enclosure.

P. Filter shall be enclosed within the VFD Equipment Line up as shown on plans.

Q. The harmonic mitigation equipment shall be handled, stored, and installed in accordance with the manufacturer's recommended installation practices as found in the installation, operation, and maintenance manual. Installation shall comply with all applicable codes.

R. If capacitors require to be switched off at low motor speeds, filter manufacturer shall provide a contactor in the filter enclosure to be switched by the VFD.

2.05 SOURCE QUALITY CONTROL

A. Section 01 45 00 – Quality Control: Manufacturer quality control.

B. Shop inspect and perform standard productions tests for each controller.

C. Make completed controllers available for inspection at manufacturer's factory prior to packaging for shipment. Notify Engineer at least seven days before inspection is allowed.

D. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Engineer at least seven days before inspections and tests are scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify surface is suitable for controller installation.

C. Verify building environment is maintained within service conditions required by manufacturer.

D. Verify that field measurements are as indicated on shop drawings and clearances are as instructed by manufacturer.

3.02 INSTALLATION

A. Section 01 45 00 – Quality Control: Manufacturer's instructions.

B. Install control where indicated, in accordance with manufacturer's written instructions and in accordance with NEMA ICS 7.1.

C. Tighten accessible connections and mechanical fasteners after placing controller.

D. Install fuses in fusible switches.

E. Select and install overload heater elements in motor controllers to match installed motor characteristics.

F. Install engraved plastic nameplates in accordance with Section 26 05 53 - Identification for Electrical Systems.

G. Neatly type label inside controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

H. Ground and bond controller in accordance with Section 26 05 26 - Grounding and Bonding for Electrical Systems.

3.03 FIELD QUALITY CONTROL

A. Section 01 45 00 - Quality Control and 01 77 00 - Closeout Procedures: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.16, and NEMA ICS 7.1.

D. The service division of the variable frequency drive manufacturer shall perform all start-up services. The use of third-party supplier start-up personnel is not allowed.

E. Start-up personnel shall be direct employees of the variable frequency drive manufacturer and shall be degreed engineers familiar with all facets of the drive.

F. At a minimum, the start-up service shall include:
1. Pre-Power Check:
    a. Megger Motor Resistances: Phase to Phase and Phase to Ground.
    b. Verify system grounding per manufacturer’s specifications.
    c. Verify power and signal grounds.
    d. Check connections.
    e. Check environment.
2. Drive Power-up and Commissioning:
    a. Measure Incoming Power Phase to Phase and Phase to Ground.
    b. Measure DC Bus Voltage.
    c. Measure AC Current Unloaded and Loaded.
    d. Measure Output Voltage Phase to Phase and Phase to Ground.
    e. Verify input reference signal.
3. Record all measurements.
4. Tune drive for system operation.
5. Install approved Drive Parameter Listing developed previously. Contractor and Start-up Tech shall verify installed motor data.

G. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.

H. After installation and a reasonable run-in period and before final inspection, test the units in the presence of Engineer.

I. Provide all instruments, test equipment and personnel required for the test.

J. Record in increments of 5 Hz from minimum to maximum speed:
1. Input Kilowatts.
2. Amperes in each phase.
3. All line to line and line to neutral voltages.
4. Input Power Factor.
5. Drive input and output cooling air temperature.
6. Room temperature.
7. Input and output waveform with harmonic content analysis.
8. Waveform at the feeder bus with harmonic content analysis.
9. Other items as recommended by the drive manufacturer.

K. Test alarm and shutdown circuits by simulating conditions.

L. Submit 3 copies of a certified test report of all test to Engineer.

3.04 MANUFACTURER'S FIELD SERVICES

A. Section 01 45 00 - Quality Control: Manufacturer’s field services.

B. Prepare and startup variable frequency drives.

3.05 ADJUSTING

A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.06 CLEANING

A. Touch up scratched or marred surfaces to match original finish.

3.07 DEMONSTRATION AND TRAINING

A. Furnish 8 hours of instruction total for two plant ground, to be conducted at project site with manufacturer’s representative, one at startup and one after six months of operation.

B. Demonstrate operation of controllers in automatic and manual modes.

C. The basis of the training shall be the variable frequency drive, the engineered drawings and the user manual. At a minimum, the training shall:
1. Review of the engineered drawings identifying the components shown on the drawings.
2. Review starting/stopping and speed control options for the controller.

3. Review operation of the Human Interface for programming and monitoring of the variable frequency drive.
4. Review the maintenance requirements of the variable frequency drive.
5. Review safety concerns with operating the variable frequency drive.

END OF SECTION

APPENDIX A: PLANS

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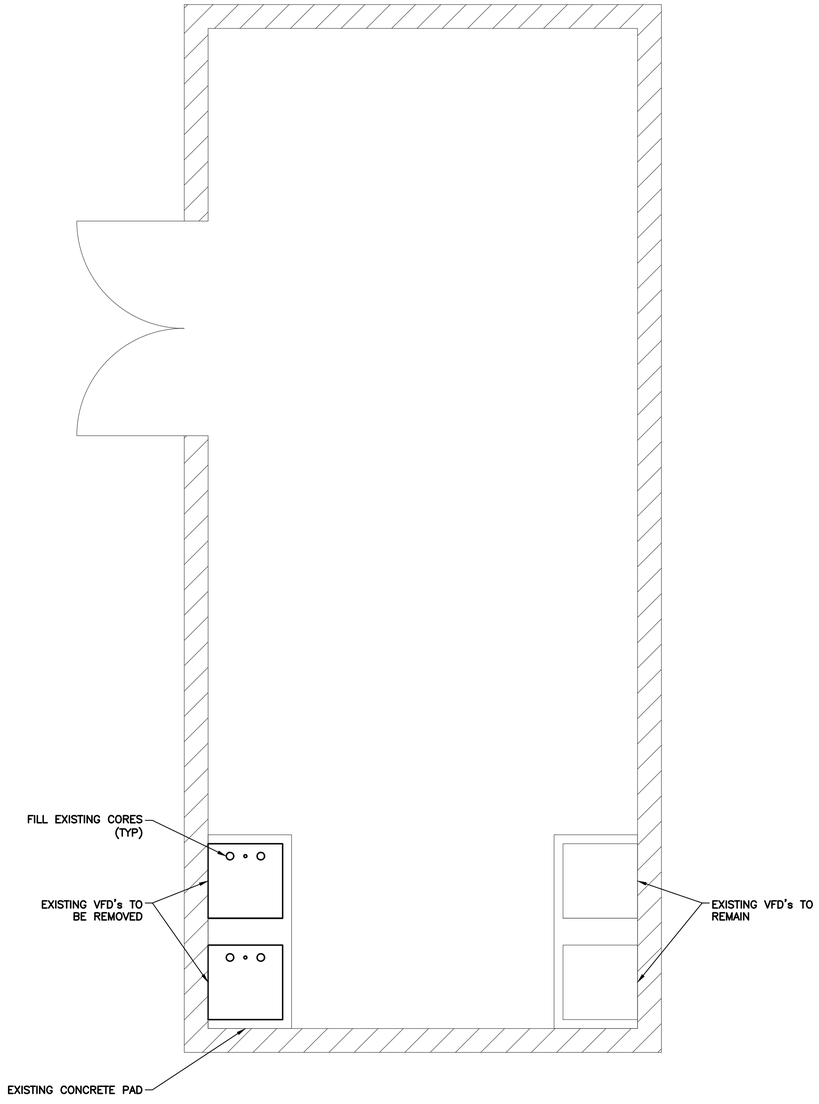
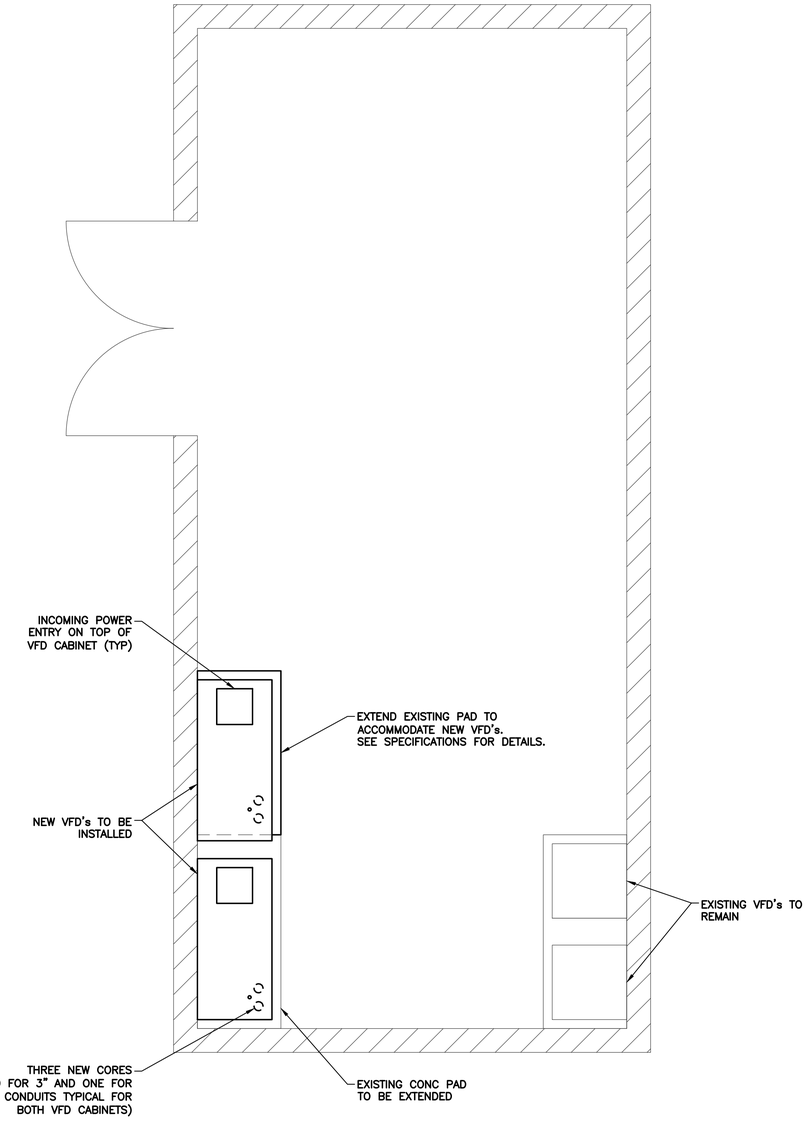


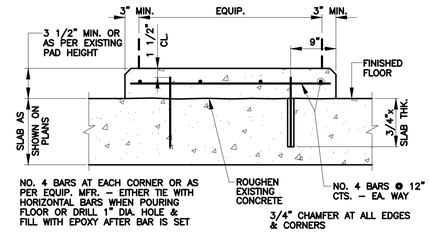
SECOND FLOOR SOUTH DEMOLITION PLAN
SCALE: 1/2"=1'-0"



SECOND FLOOR SOUTH PROPOSED PLAN
SCALE: 1/2"=1'-0"

PROJECT NOTES:

1. CONTRACTOR TO VERIFY FIELD CONDITIONS AND COORDINATE ANY INTERFERENCES WITH THE OWNER AND THE ENGINEER PRIOR TO INSTALLATION.
2. ONLY ONE VFD CAN BE DOWN AT A TIME DURING CONSTRUCTION. COORDINATE WITH OWNER FOR OUTAGES. REMOVE, INSTALL, TEST, COMMISSION AND PUT INTO SERVICE ONE VFD BEFORE TAKING DOWN THE OTHER VFD.
3. FLOOR CORES AND CONDUIT/WIRE ROUTING SHOWN DIAGRAMMATICALLY. CONTRACTOR TO FIELD VERIFY LOCATIONS, SIZES AND LENGTH.
4. EXISTING POWER CABLES ARE TWO SETS OF 3#4/0 AND 1#1/0 GND. EXISTING CONTROL CABLES ARE 14#14 AND TWO PAIRS OF BELDON 8719 CABLES. CONTRACTOR SHALL MATCH EXISTING WIRES.
5. INCOMING POWER AND CONTROLS ENTER THE EXISTING VFD CABINETS FROM ABOVE. DISCONNECT ALL EXISTING CABLES AND PULL BACK FOR REUSE. DISCONNECT AND REMOVE EXISTING FLEXIBLE CONDUIT.
6. SPLICE EXISTING POWER AND CONTROL CABLES WITH NEW CABLES IN NEW NEMA 1 JUNCTION BOXES. EXISTING TW/SH PAIRS SHALL BE LANDED ON TERMINAL STRIPS INSTALLED IN THAT JUNCTION BOX. NEW TW/SH PAIRS SHALL BE ROUTED FROM TERMINAL STRIPS TO NEW VFD CABINET. ROUTE NEW CABLES FROM JUNCTION BOXES TO NEW VFD CABINETS THROUGH THE TOP ENTRY WITH NEW FLEXIBLE CONDUIT.
7. THE FLOOR SLAB OF THE VFD ROOM IS 15 FEET ABOVE FINISHED FLOOR ON THE GROUND LEVEL. THERE IS CURRENTLY AN 8 FOOT DROP CEILING INSTALLED IN THAT LOWER LEVEL THAT WILL NEED TO BE REMOVED AND REINSTALLED FOR WORK TO BE DONE.
8. LOAD FEEDS AND CONTROLS ENTER THE VFD CABINETS FROM BELOW. DISCONNECT EXISTING CABLES AND PULL BACK FOR REUSE. DISCONNECT AND REMOVE ANY FLEXIBLE CONDUIT.
9. SPLICE EXISTING POWER AND CONTROL CABLES WITH NEW CABLES IN NEW NEMA 1 JUNCTION BOXES. ROUTE NEW CABLES FROM JUNCTION BOXES TO NEW VFD CABINETS THROUGH NEW FLOOR CORES INTO BOTTOM ENTRY WITH NEW RIGID GALVANIZED CONDUIT.



EQUIPMENT PAD REINFORCING
UNLESS SHOWN OTHERWISE ON PLANS

DEUCHLER
CIVIL | STRUCTURAL | ELECTRICAL | ENVIRONMENTAL

ILLINOIS DESIGN FIRM
184.001830
230 WOODLAWN AVENUE
AURORA, IL 60506
PH: 630-897-4651
FAX: 630-897-5696
www.deuchler.com

REVISIONS
1.
2.
3.
4.

VERIFY SCALE:
BAR IS ONE INCH ON OFFICIAL DRAWINGS
0 1"

DATE:	12-18-19	DESIGNED:	MMC
SCALE:	AS SHOWN	DRAWN:	AS
JOB NO.	190-19090-00	CHECKED:	MMC
FIELD BOOK NO.:	N/A	APPROVED:	MMC

CITY OF GENEVA, ILLINOIS
WATER TREATMENT PLANT
VFD REPLACEMENT

SHT 1
OF 1

Plotted: 1/2/2020 12:43:14 PM

APPENDIX B: NEW VFD INFORMATION

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NOTES:

1. PART NUMBER: 6SL3710-3GJ33-1AS3
   A) AMBIENT TEMPERATURE IS: 40 DEGREES CELSIUS (104 DEGREES FAHRENHEIT).
   B) INSTALLATION ALTITUDE IS 2000 M (6560 FT.) ABOVE SEA LEVEL WITHOUT DERATING.
   C) MAXIMUM LOSSES OF 6.9 kW (23560 BTU/HR)
   D) WEIGHT 1098 KG (2420 LB)

2. INSTALLATION OF SIEMENS VARIABLE SPEED DRIVES (VSD) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES.
   A) SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B) WIRE SIZES LISTED ARE PER NEC TABLE 310-16 FOR 75°C WIRE RATED FOR A 40°C AMBIENT. CUSTOMER TO SIZE AS REQUIRED PER APPLICATION.
   C) INPUT POWER 460VAC ±10%, 3 PHASE, 60 HZ, 275A. SOLDERLESS PRESSURE LUGS LOCATED ON INPUT CIRCUIT BREAKER MCB (L1, L2, L3) WIRE RANGE: 2 WIRE – #2/0 AWG TO #600 KCMIL WIRE TYPE : Cu/Al.
   D) OUTPUT POWER : 0-460VAC, 3 PHASE, 0-100HZ, 100%. CONTINUOUS RATING: 310A. WIRE RANGE: 2 WIRE – #4 AWG TO #500KCMIL. WIRE TYPE: Cu/Al.
   E) GROUND TERMINALS : SOLDERLESS PRESSURE LUGS. RECOMMENDED WIRE SIZE: (1) #2 AWG. WIRE RANGE: (1) #4 AWG TO #350KCMIL.
   F) CONTROL: SOLDERLESS PRESSURE SCREW TERMINALS. WIRE RANGE: (1) #26 AWG – #14 AWG.

3. PRECAUTIONS:
   A) LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B) DO NOT BLOCK AIR INLET OR EXHAUST ON TOP AND BOTTOM OF UNIT.
   C) READ OWNERS MANUAL BEFORE SERVICING THIS EQUIPMENT.

4. DIMENSIONS ARE IN MILLIMETERS, [INCHES].

5. EXTERIOR FINISH IS ANSI 61.

6. ENCLOSURES ARE RATED NEMA 1 (UNFILTERED)

7. CIRCUIT BREAKER OPERATING HANDLE IS MECHANICALLY INTERLOCKED TO PREVENT ANY CABINET DOOR FROM BEING OPENED UNTIL THE CIRCUIT BREAKER IS IN THE "OFF" POSITION.

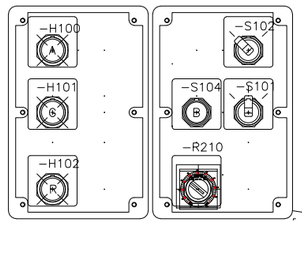
8. VENTILATION "TOP-HAT" ON ENCLOSURES ARE REMOVED FOR SHIPPING. THE "TOP HAT" MUST BE INSTALLED BEFORE PLACING THE EQUIPMENT INTO OPERATION.

9. ALLOW SUFFICIENT AISLE SPACE IN FRONT OF EQUIPMENT TO PERMIT FULL DOOR OPENING, CHECK LOCAL CODES FOR SPECIFIC REQUIREMENTS.

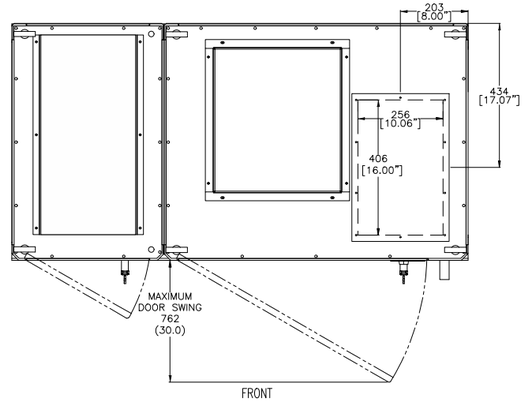
10. USE SPREADER BARS WHEN LIFTING FROM OVERHEAD.

11. POWER MODULE PART NUMBER: 6SL3320-1TE33-1AA3; FOR ENTRY IN STARTER SOFTWARE FOR COMMISSIONING/STARTUP.

CONTROLS DETAIL



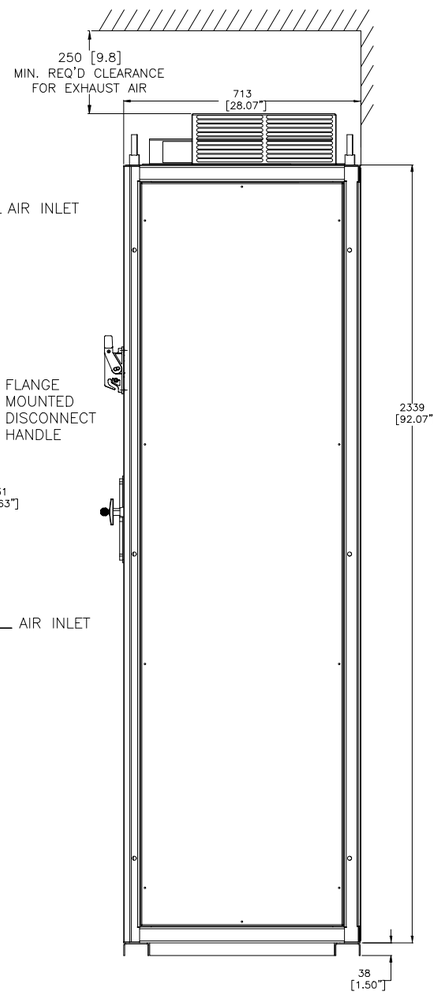
TOP

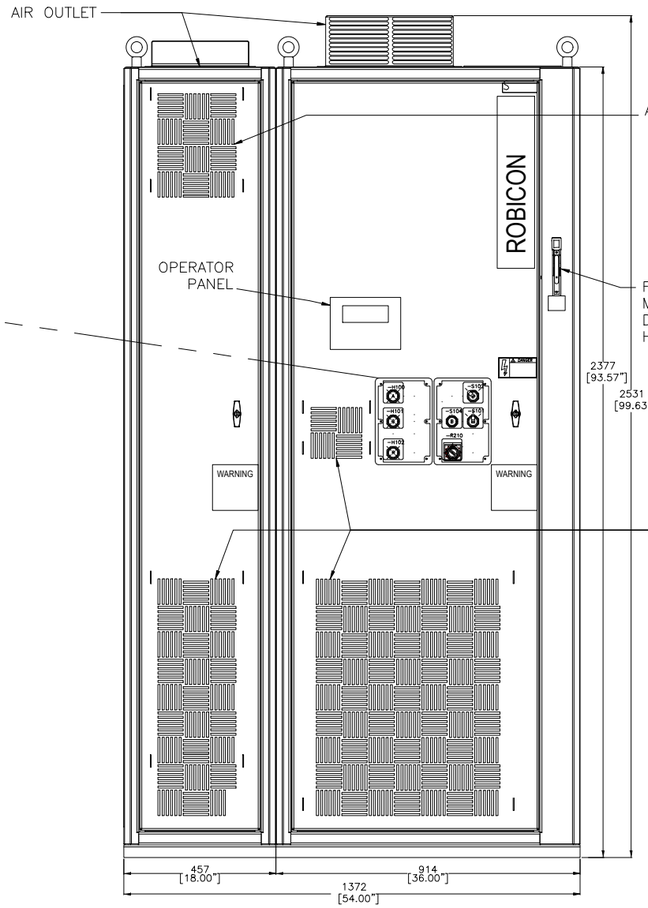


DOOR LEGEND

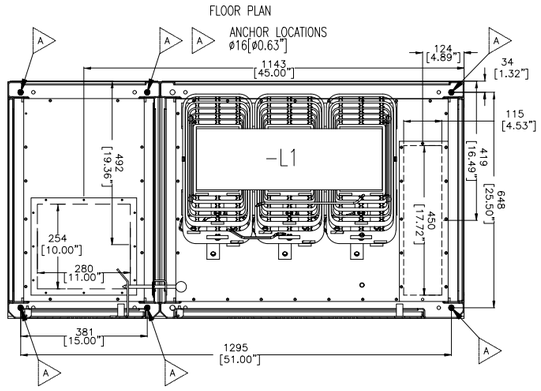
DEVICE ID	DEVICE DESCRIPTION (COLOR)
-H100	LOW PRESSURE (AMBER)
-H101	DRIVE RUNNING (GREEN)
-H102	STOPPED (RED)
-S104	RESET (BLACK)
-R210	SPEED COMMAND
-S101	ON-OFF-REMOTE
-S102	LOCAL-REMOTE

RIGHT SIDE





FLOOR PLAN



ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ

CUSTOMER: City of Geneva
CUST. ORDER NO.: 7082019
SII ORDER NO.: 3007926655

W150CP OUTLINE DRAWING: EXTERIOR VIEWS
FRAME SIZE 'G1' CABINET LAYOUT
310 AMPS; 250HP

Confidential Property of
Siemens Industry, Inc.
Process Industries and Drives

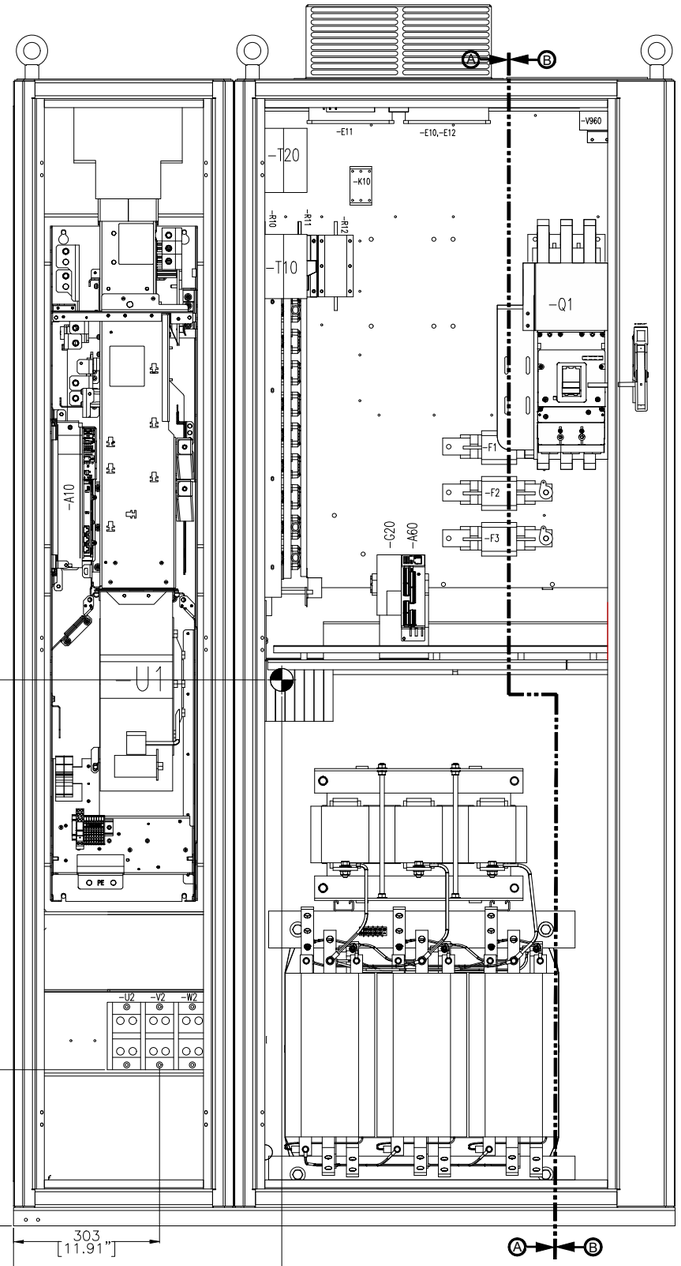
R05.3

SIZE B | DRAWING/PART NO. 3007926655-L-101 | SHEET 01 | CONT 02

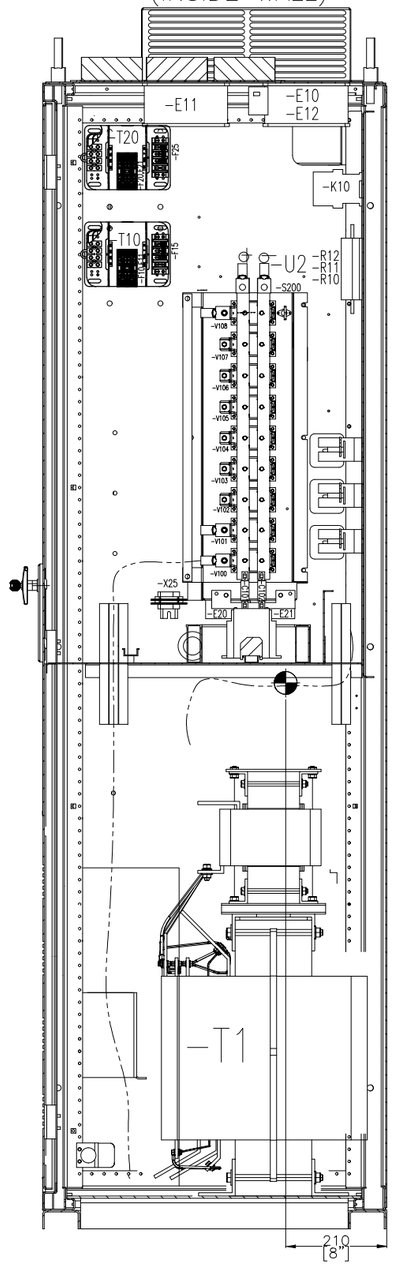
NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES] UNLESS SPECIFIED OTHERWISE.
2. LAYOUT SHOWS MAXIMUM COMPONENT SIZE WITH ALL SUPPLIED OPTIONS. ACTUAL COMPONENT SIZE MAY BE SMALLER.
3. REMOVE OR PUNCH THROUGH REMOVABLE PLATES TO ROUTE THE CABLES.
4. REFER TO PAGE 3 FOR DETAIL ON THE DIVIDER CONTROL PANEL.

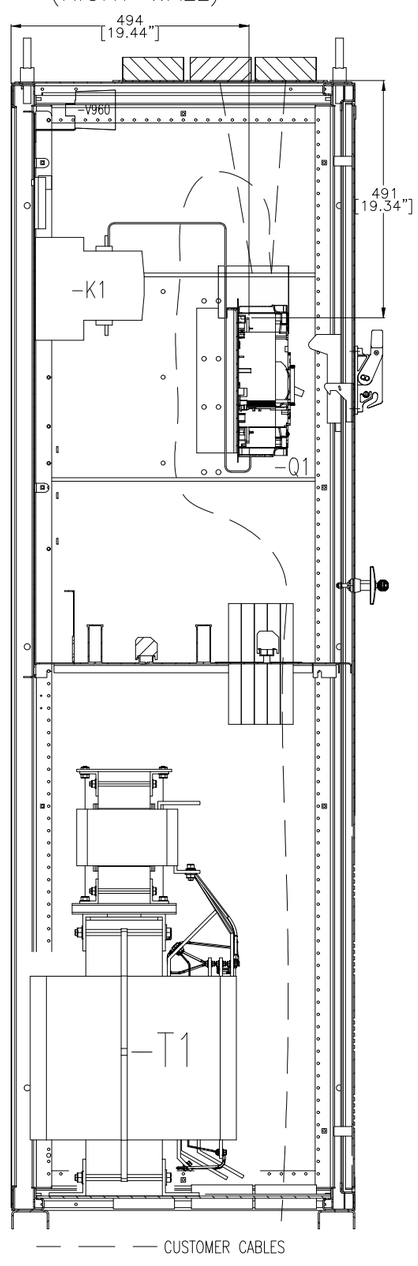
⊕ – CENTER OF GRAVITY



SECTION B–B
(INSIDE WALL)



SECTION A–A
(RIGHT WALL)



ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ

CUSTOMER: City of Geneva
CUST. ORDER NO.: 7082019
SII ORDER NO.: 3007926655

W150CP OUTLINE DRAWING: INTERIOR VIEWS
FRAME SIZE 'G1' CABINET LAYOUT
310 AMPS; 250HP

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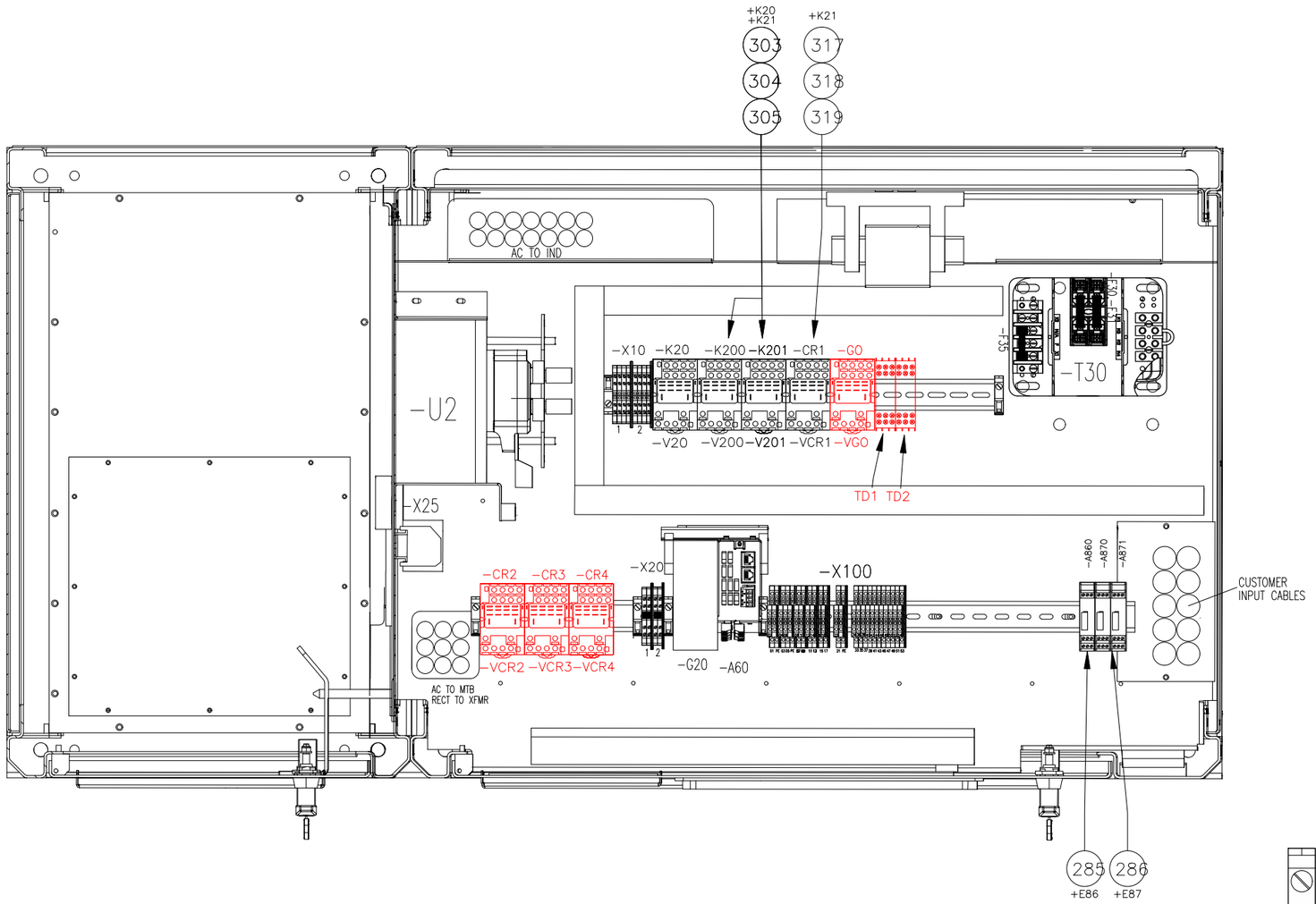
Process Industries and Drives

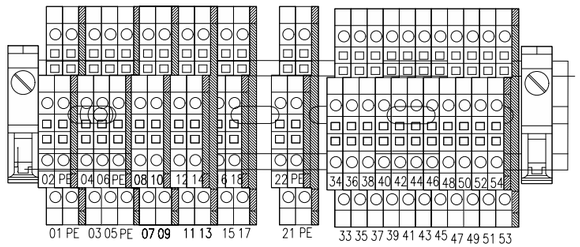
R05.3

SIZE B | DRAWING/PART NO. 3007926655–L–101 | SHEET 02 | CONT 03

CONTROL PANEL DETAIL



-X100 DETAIL



ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

ISS	DATE	DESCRIPTION	DWN	CHK	APR

THIRD ANGLE PROJ

CUSTOMER: City of Geneva
CUST. ORDER NO.: 7082019
SII ORDER NO.: 3007926655

W150CP OUTLINE DRAWING: CONTROL PANELS
FRAME SIZE 'G1' CONTROLS LAYOUT
310 AMPS; 250HP

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Process Industries and Drives

R05.3

SIZE	DRAWING/PART NO.	SHEET	CONT
B	3007926655-L-101	03	FNL

460VAC, 3-PHASE, 60HZ
CUSTOMER SUPPLY
(USE 75°C COPPER WIRE ONLY)

P G P L1 P L2 P L3 1 2 3 4

-Q1
400A

T1 T2 T3

FLEXIBAR FLEXIBAR FLEXIBAR

0101 0102 0103

[3.1]

-K10
0101P 1 2 0125P -R10
0102P 3 4 0126P -R11
0103P 5 6 0127P -R12
[5.8]

-K1 1 2 0104P
-F1 1 2 0107P A1 -L1 A2 H1
0106P 0105P 0104P

-K1 3 4 0105P
-F2 1 2 0108P B1 B2 H2

-K1 5 6 0106P
-F3 1 2 0109P C1 C2 H3
315A
[5.9]

5 -V960 G
L1 L2 L3

18 PULSE AUTOTRANSFORMER ASSY
-T1
R1 R2 R3 R4 R5 R6 R7 R8 R9

WINDING THERMOSTATS
[3.13]

18 PULSE RECTIFIER ASSEMBLY, -U2
-V100 TO -V108
2 + 0119P
0110P V108:1
0111P V107:1
0112P V106:1
0113P V105:1
0114P V104:1
0115P V103:1
0116P V102:1
0117P V101:1
0118P V100:1
3 - 0120P

HEATSINK THERMOSTAT -S200 [3.13]

TO -U1 [2.8]

NOTES:

1. WIRES NOT IDENTIFIED BY <SIZE,COLOR> ARE INCLUDED IN THE BILL OF MATERIAL EITHER AS PREMANUFACTURED WIRE HARNESS or KIT.
2. LETTER "B" OR "D" OR "M" AT THE END OF THE POWER CABLE SIZE REFERS TO FOLLOWING.
   B = CLASS B "CODE" CABLE, BK
   D = 2kV DLO "FLEX" CABLE, BK
   M = MTW/HKUP "FLEX" CABLE, BK
   EXAMPLE: CABLE <4/0,B> IS 4/0 CLASS B 600V CODE CABLE.
3. SUFFIX "P" AT THE END OF THE WIRE NUMBER INDICATES POWER CIRCUIT CABLE.
4. WIRING THAT IS EXTERNAL FROM THE SUPPLIED EQUIPMENT IS IDENTIFIED WITH A SLASH "-/X" AND ASSIGNED A LEVEL DESIGNATOR (X).
   X = L (ANALOG SIGNALS <50V, DIGITAL SIGNALS <15V)
   M (ANALOG SIGNALS >50V, DIGITAL SIGNALS <50VDC)
   H (DIGITAL SIGNALS >50VDC, AC/DC CONTROL CIRCUITS)
   P (AC/DC POWER CIRCUITS)
5. USE THE SHORTEST POSSIBLE ROUTE TO CONNECT THE SPD LEAD WIRES AND THEN CUT TO EXACT LENGTH.

ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ

S501

CUSTOMER: City of Geneva
CUST. ORDER NO.: 7082019
SII ORDER NO.: 3007926655

GEN-II W150CP SCHEMATICS
480VAC POWER CONNECTION DETAILS

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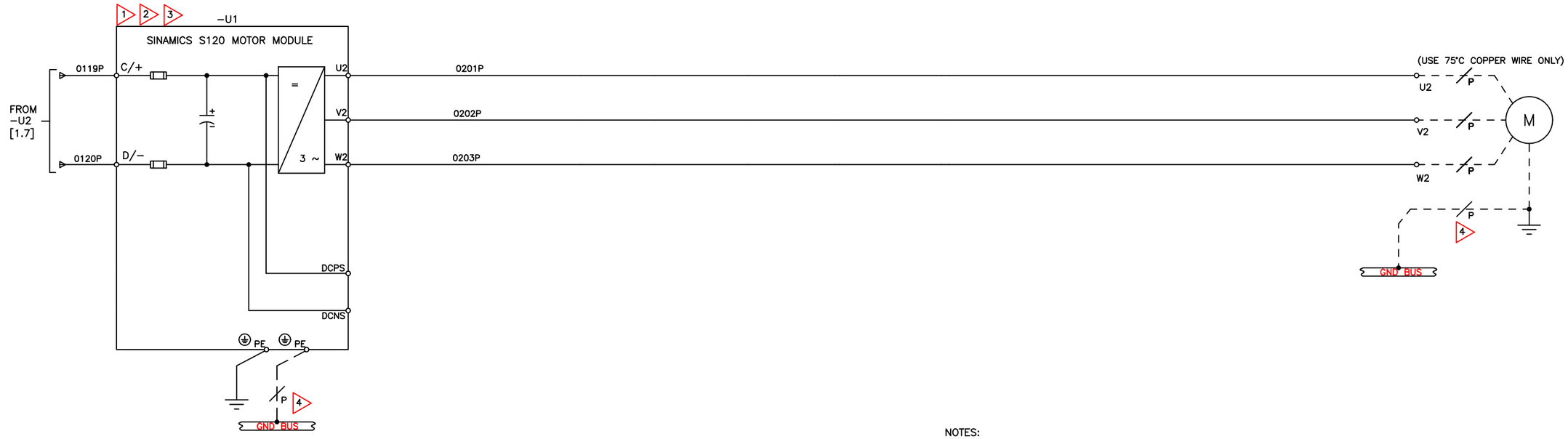
Siemens Industry, Inc.
Process Industries and Drives

AF

SIZE B | DRAWING/PART NO. 3007926655-S-101 | SHEET 01 | CONT 02



NOTES:

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   B = CLASS B "CODE" CABLE, BK
   D = 2kV DLO "FLEX" CABLE, BK
   M = MTW/HKUP "FLEX" CABLE, BK
   EXAMPLE: CABLE <4/0,B> IS 4/0 CLASS B 600V CODE CABLE.

3. SUFFIX "P" AT THE END OF THE WIRE NUMBER INDICATES POWER CIRCUIT CABLE.

4. WIRING THAT IS EXTERNAL FROM THE SUPPLIED EQUIPMENT IS IDENTIFIED WITH A SLASH "P/X" AND ASSIGNED A LEVEL DESIGNATOR (X).
   X = L (ANALOG SIGNALS <50V, DIGITAL SIGNALS <15V)
   M (ANALOG SIGNALS >50V, DIGITAL SIGNALS <50VDC)
   H (DIGITAL SIGNALS >50VDC, AC/DC CONTROL CIRCUITS)
   P (AC/DC POWER CIRCUITS)

ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ

S501

CUSTOMER: City of Geneva
CUST. ORDER NO.: 7082019
SII ORDER NO.: 3007926655

GEN–II W150CP SCHEMATICS
480VAC POWER CONNECTION DETAILS

AF

SIZE B

DRAWING/PART NO. 3007926655–S–101

SHEET 02

CONT 03

460VAC
[1.15]

0101 0102 0103

[5.1]

CU_U1
(NETWORK CABLE)

CU_TM
(NETWORK CABLE) [4.1]

−U1 Motor Module

−X400 DRIVE−CLiQ socket 1
−X401 DRIVE−CLiQ socket 2
−X402 DRIVE−CLiQ socket 3

F10
F11

−X9
1 (+) P24 — 24VDC [5.12]
2 (−) M
3 VL1
4 VL2 — TO −K10 AND −K1 CONTROLS [5.8]
5 HS1
6 HS2 — CONTACTOR CTRL RELAY

IPD CARD

−X41
Safety (N) 1
Safety (P) 2
KTY (L) 3
KTY (H) 4

−X42
P24 (+) 1 — 0306
M (−) 3 — 0307
P24 (+) 2 — 0308
M (−) 4 — 0309

−X46
BR OUTPUT (+) 1
BR OUTPUT (−) 2
FB OUTPUT (+) 3
FB OUTPUT (−) 4

PE

−A31

RUN
ALARM
FAULT
F1 F2 F3 F4 F5
MENU
LOC/REM

−X524 1 2

−X540 2 3 5

PREMANUFACTURED FORM CABLE
0310 <RD>
0310 <WH>
0310 <BK>
(RS232 INTERFACE)

−A10 Control Unit CU320−2 DP

−X124
[4.3] +24V
[4.4] M

−X140
2 RxD
3 TxD
5 M

−X122
1 DI 0 (Ext Alarm1/A7850)
2 DI 1 (Ext Fault1/A7860)
3 DI 2 (OFF3/E−STOP Cat.1)
4 DI 3 (OFF2/E−STOP Cat.0)
5 DI 16
6 DI 17
7 M1
8 M
9 DI/DO 8 (P24)
10 DI/DO 9 (P24)
11 M
12 DI/DO 10 (P24)
13 DI/DO 11 (P24)
14 M

−X132
1 DI 4 (Ext Fault3)
2 DI 5 (Ext Fault2)
3 DI 6 (Infeed Ready) — 0304
4 DI 7
5 DI 20
6 DI 21
7 M2
8 M
9 DI/DO 12 (P24) — 0301
10 DI/DO 13 (P24)
11 M
12 DI/DO 14 (P24)
13 DI/DO 15 (Ack/Chopper)
14 M

−20.BK−

−U2 −S200 [1.9] — 0302 — −T1 WINDING THERMOSTATS [1.12]

−X100 DRIVE−CLiQ socket 0
−X101 DRIVE−CLiQ socket 1
−X102 DRIVE−CLiQ socket 2
−X103 DRIVE−CLiQ socket 3

Ethernet (LAN) INTERFACE Connector → −X127
TXP 1
TXN 2
RXP 3
N/C 4
N/C 5
RXN 6
N/C 7
N/C 8

PROFIBUS INTERFACE SUB−D Connector → −X126
SHIELD 1
U0V 2
RxD/TxD−P 3
CNTR−P 4
DGND 5
VP 6
U24V 7
RxD/TxD−N 8
N/C 9

−X129
P3V3_BOP 1
M 2
NC 3
SDA1 4
SCL1 5
NC 6
NC 7
P3V3_BOP 8

RESET

COMPACT FLASH CARD
−X128
1..50 CF

−X138
1 T0 −H1 Ready
2 T1 −H2 Profibus
3 T2 −H3 Option
4 M −H4 Simotion

DP ADDRESS
−S1 1 2 3 4 5 6 7

PE

NOTES:

1. WIRES NOT IDENTIFIED BY <SIZE,COLOR> ARE INCLUDED IN THE BILL OF MATERIAL EITHER AS PREMANUFACTURED WIRE HARNESS or KIT.
2. JUMPER ALREADY IN THE CONNECTOR.
3. SEE OPERATING INSTRUCTIONS FOR ADJUSTING THE FAN VOLTAGE (−U1−T10), DEFAULT SETTING:(PRIMARY):480V.
4. WIRING THAT IS EXTERNAL FROM THE SUPPLIED EQUIPMENT IS IDENTIFIED WITH A SLASH "/X-" AND ASSIGNED A LEVEL DESIGNATOR (X).
   X = M (ANALOG SIGNALS >50V, DIGITAL SIGNALS <50VDC)

ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ
S501

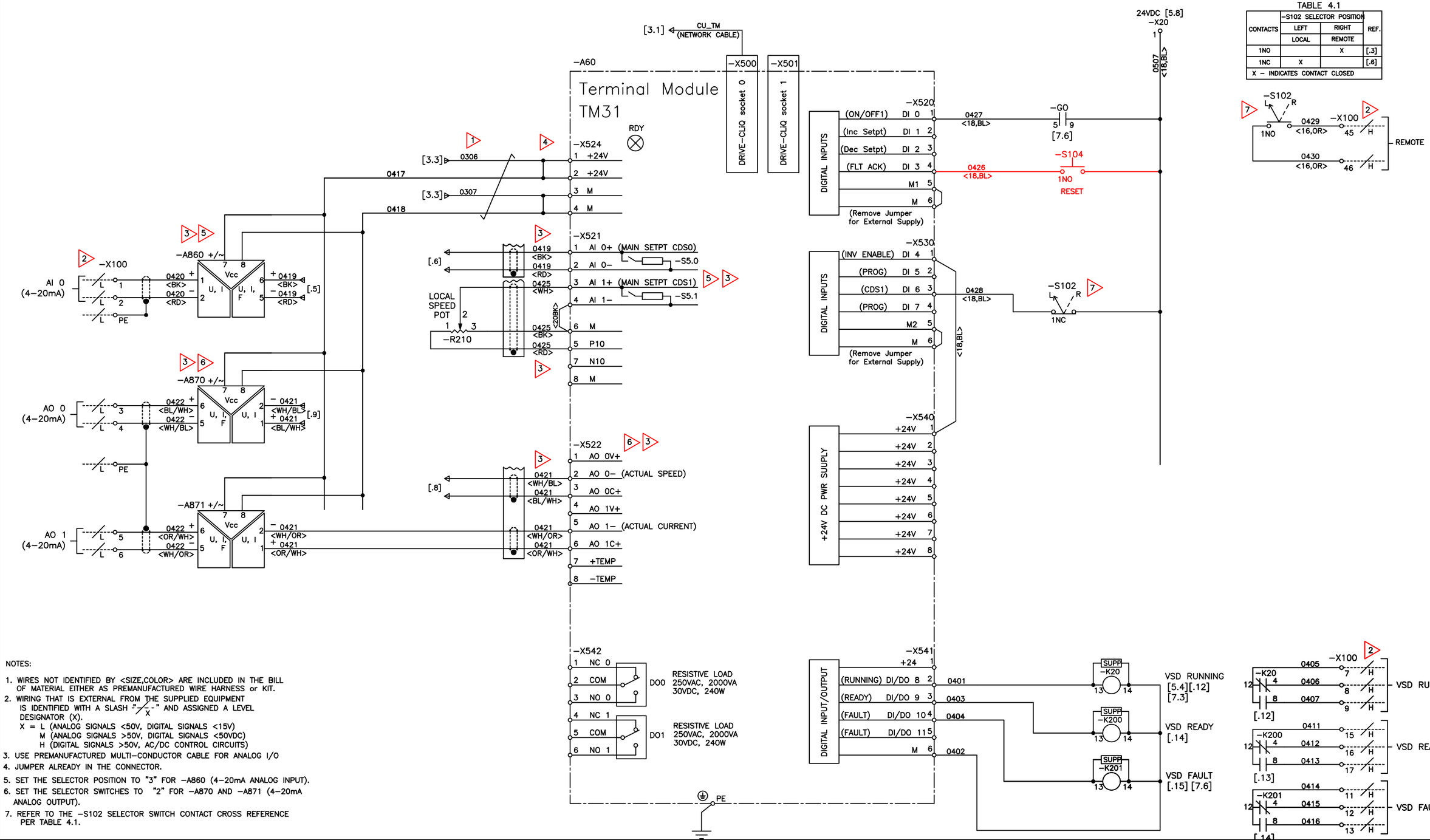
CUSTOMER: City of Geneva
CUST. ORDER NO.: 7082019
SII ORDER NO.: 3007926655

GEN−II W150CP SCHEMATICS
CONTROL UNIT CONNECTION DETAILS

Confidential Property of
Siemens Industry, Inc.
Process Industries and Drives

AF

SIZE B | DRAWING/PART NO. 3007926655−S−101 | SHEET 03 | CONT 04



NOTES:

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2. WIRING THAT IS EXTERNAL FROM THE SUPPLIED EQUIPMENT IS IDENTIFIED WITH A SLASH "/X" AND ASSIGNED A LEVEL DESIGNATOR (X).
   X = L (ANALOG SIGNALS <50V, DIGITAL SIGNALS <15V)
   M (ANALOG SIGNALS >50V, DIGITAL SIGNALS <50VDC)
   H (DIGITAL SIGNALS >50V, AC/DC CONTROL CIRCUITS)
3. USE PREMANUFACTURED MULTI−CONDUCTOR CABLE FOR ANALOG I/O
4. JUMPER ALREADY IN THE CONNECTOR.
5. SET THE SELECTOR POSITION TO "3" FOR −A860 (4−20mA ANALOG INPUT).
6. SET THE SELECTOR SWITCHES TO "2" FOR −A870 AND −A871 (4−20mA ANALOG OUTPUT).
7. REFER TO THE −S102 SELECTOR SWITCH CONTACT CROSS REFERENCE PER TABLE 4.1.

ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ

S501

CUSTOMER: City of Geneva
CUST. ORDER NO.: 7082019
SII ORDER NO.: 3007926655

GEN−II W150CP SCHEMATICS
TERMINAL MODULE CONNECTION DETAILS

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Siemens Industry, Inc.
Process Industries and Drives

SIZE B | DRAWING/PART NO. 3007926655−S−101 | SHEET 04 | CONT 05

AF

460VAC [3.10]

0101 0102 0103

1

[6.1]

−T10
440−480V:110−120V
750VA

−F10 8A
−F11 8A
H1 H2 H3 H4 X1 X2

0502

−X10 2

−F15 10A XF
0501 −X10 1

−T20
440−480V:110−120V
750VA

−F20 8A
−F21 8A
H1 H2 H3 H4 X1 X2

−F25 10A XF
0505

−K20
9 5
0510 −X15 1

ROOF FANS
−E10
−E11
−E12
L N PE
0506 −X15 2

INTERNAL JUMPER

1 [4.12]

−G20
24 VDC
PWR SUP
5A
L1 N PE
M M L+ L+
0508 0508 0507 0507

RECTIFIER FANS
−E20
−E21
+ −
<RD> <BK>

−K1
13 14 [.9]
0509 −X25 1
−X25 2

−X20 1
−X20 2

−U1
−X9 −HS −X9
5 [3.7] 6
0503

SUPP
−K10
A1 A2

PRECHARGE CONTACTOR [1.6]

JUMPER <16,RD>

−U1
−X9 −VL −X9
4 [3.6] 3
0504

SUPP
−K1
A1 A2

INPUT CONTACTOR [.7] [1.8]

−U1
−X9 [3.6] −X9
1 2

NOTES:

1. WIRES NOT IDENTIFIED BY <SIZE,COLOR> ARE INCLUDED IN THE BILL OF MATERIAL EITHER AS PREMANUFACTURED WIRE HARNESS or KIT.

ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ

S501

CUSTOMER: City of Geneva
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SII ORDER NO.: 3007926655

GEN−II W150CP SCHEMATICS
FAN DETAILS AND 115VAC/24VDC SUPPLY CONN.

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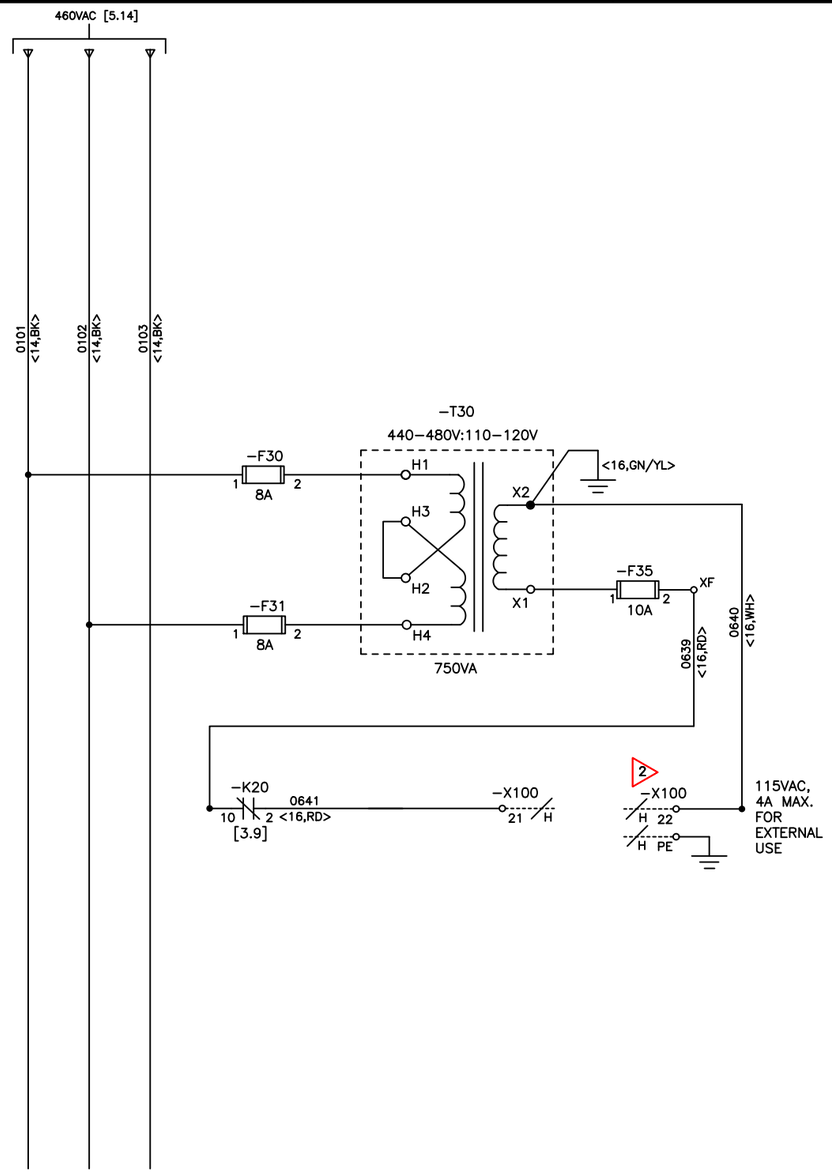
Process Industries and Drives

AF

SIZE B

DRAWING/PART NO. 3007926655−S−101

SHEET 05 CONT 06



NOTES:
1. FIELD WIRING WITH A "----/H---" DESIGNATION MAY ONLY BE CONNECTED TO CONTROL CIRCUITS WITH MAXIMUM 10A AMPACITY.

ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

THIRD ANGLE PROJ

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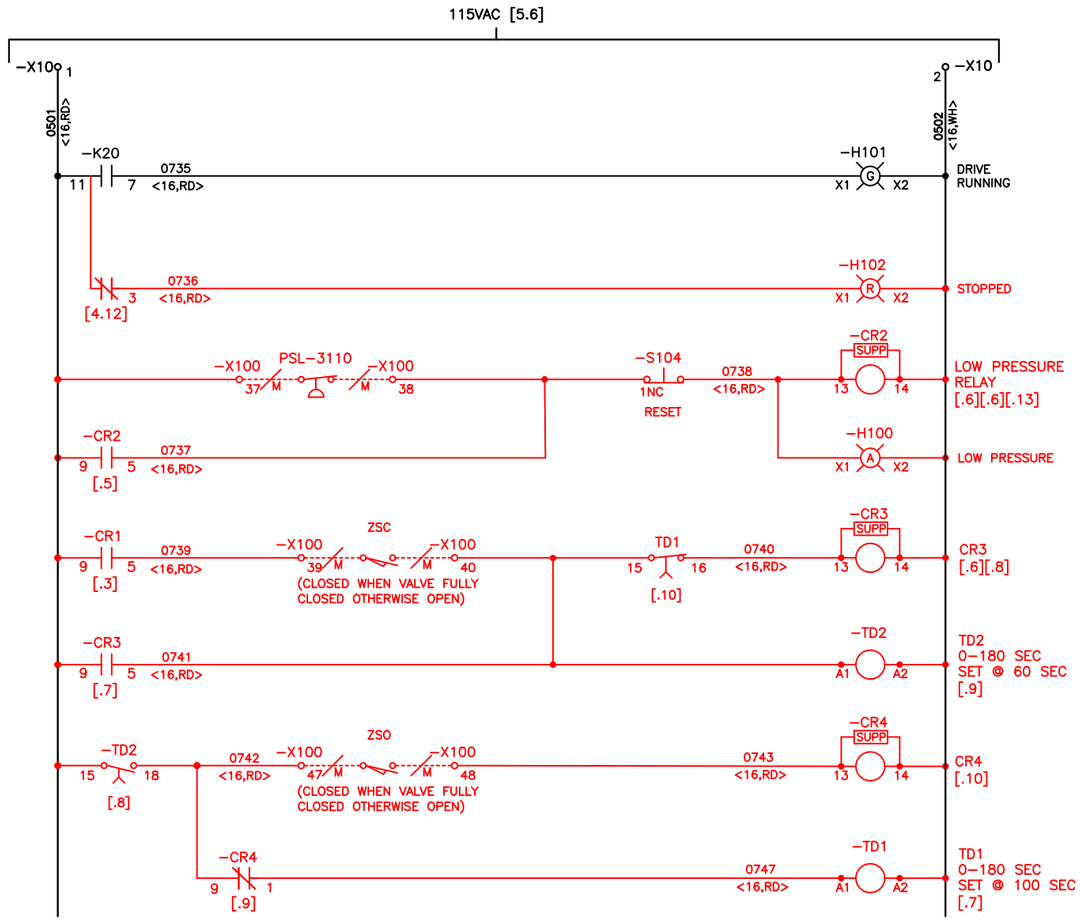
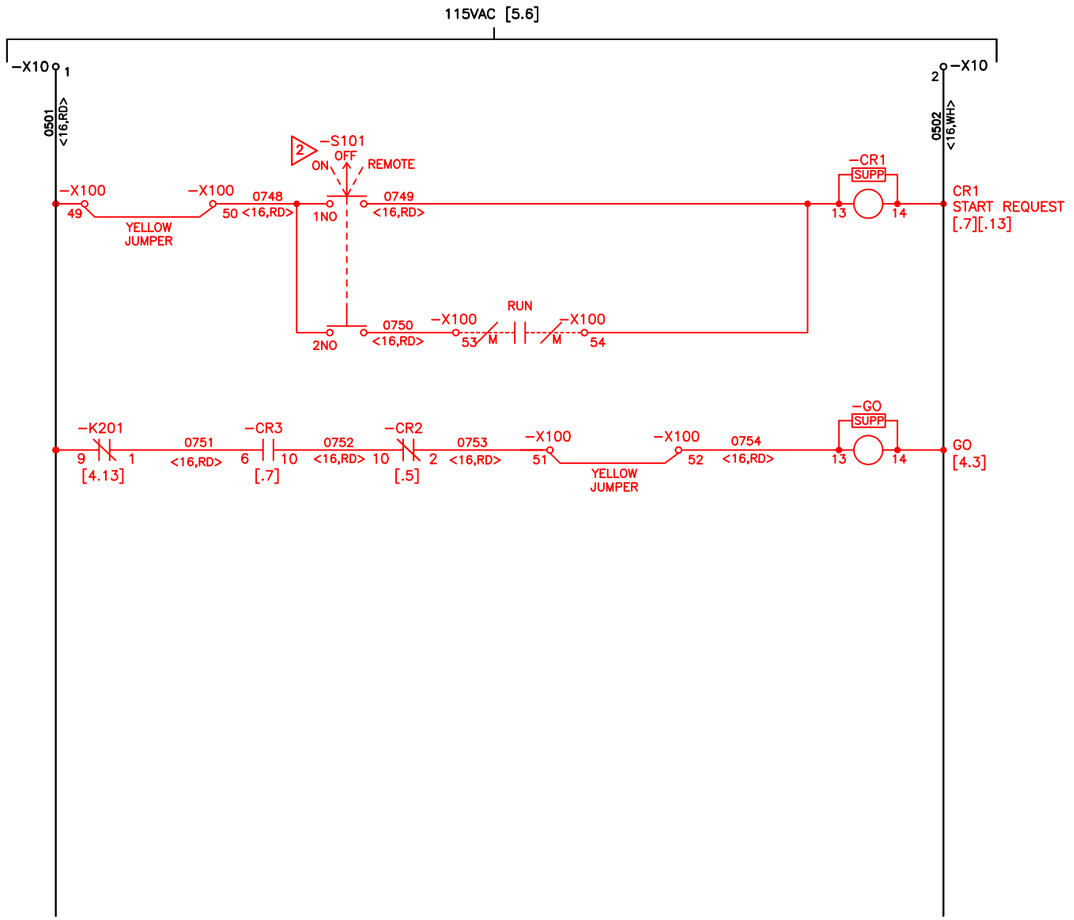
SIZE	DRAWING/PART NO.	SHEET	CONT
B	3007926655–S–101	06	07





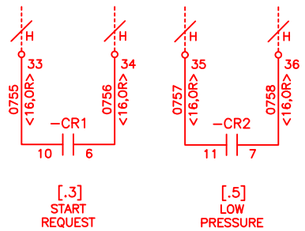
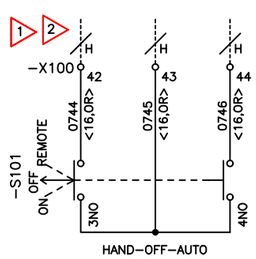


TABLE 7.1

CONTACTS	-S101 SELECTOR POSITION			REF.
	LEFT	CENTER	RIGHT	
	ON	OFF	REMOTE	
1NO	X			[.7]
2NO			X	[.9]
3NO	X			[.15]
4NO			X	[.15]

X – INDICATES CONTACT CLOSED



NOTES:

1. FIELD WIRING WITH A "----/H---- " DESIGNATION MAY ONLY BE CONNECTED TO CONTROL CIRCUITS WITH MAXIMUM 10A AMPACITY.
2. REFER -S101 SELECTOR SWITCH CONTACT CROSS REFERENCE (TABLE 7.1).

ISS	DATE	DESCRIPTION	DWN	CHK	APR
AA	07/15/19	INITIAL RELEASE	MRA	MRA	MRA

ISS	DATE	DESCRIPTION	DWN	CHK	APR

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SIZE B | DRAWING/PART NO. 3007926655-S-101 | SHEET 07 | CONT FNL

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